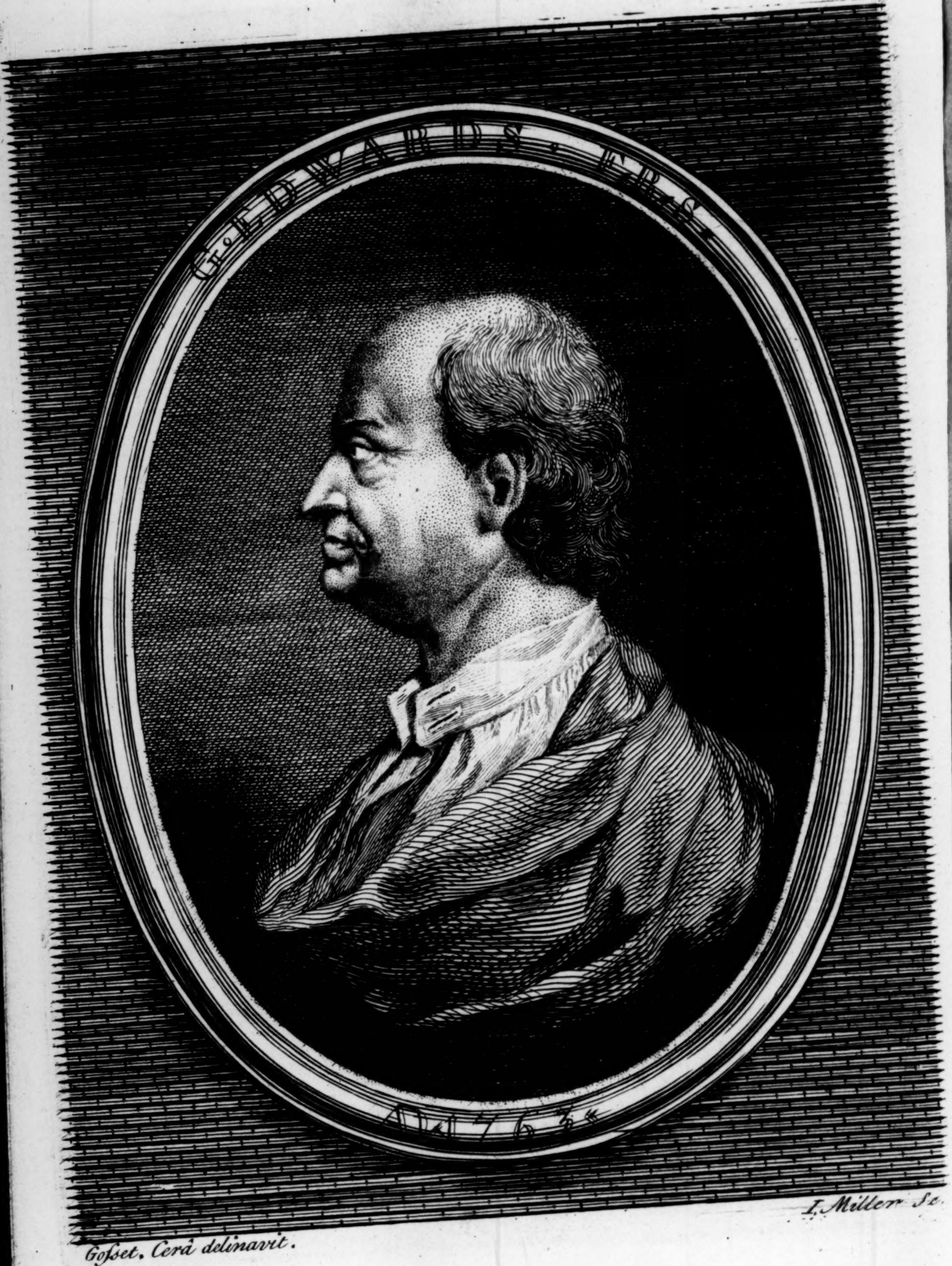

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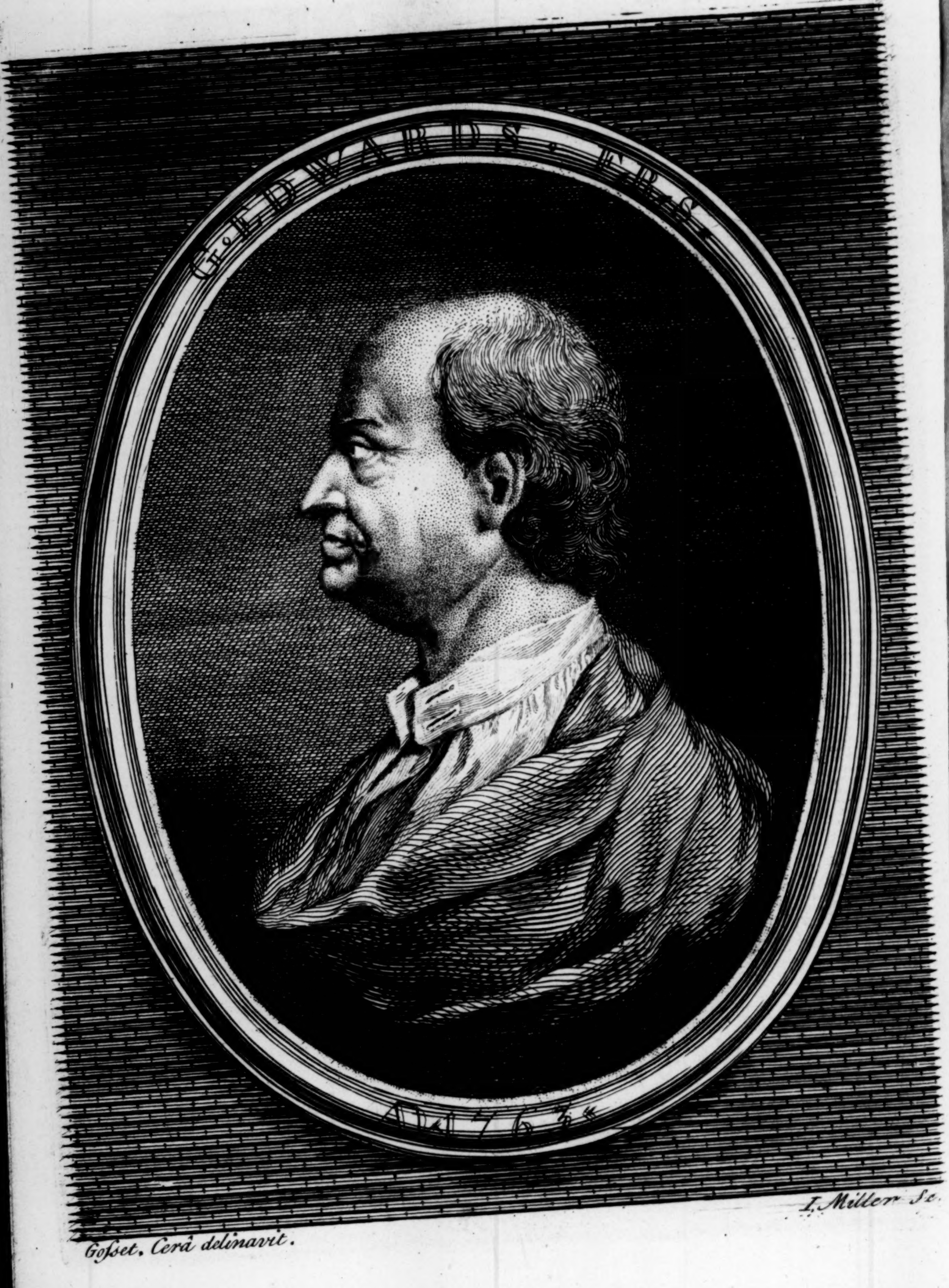
I. Miller Sc.


G. EDWARDS. F.R.S.
AD 1763.

Goſset. Cerâ delinavit.

I. Miller Sc.

ESSAYS

UPON

NATURAL HISTORY,

AND OTHER

MISCELLANEOUS SUBJECTS,

By GEORGE EDWARDS,
Fellow of the ROYAL SOCIETY, and of the SOCIETY
of ANTIQUARIES, LONDON.

TO WHICH IS ADDED,
A CATALOGUE, IN GENERICAL ORDER,
OF THE
BIRDS, BEASTS, FISHES, INSECTS, PLANTS, &c.
contained in Mr. EDWARDS' Natural Hiſtory.

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PREFACE.

THE greateſt part of the following Eſſays have already appeared before the public in Mr. *Edwards' Natural Hiſtory*, but in a detached and unconnected form, and at an expence perhaps rather too great for many who delight in Natural Hiſtory.

It was therefore to accommodate ſuch, and to aſſiſt the curious in their reſearches, or any future writer upon this ſubject, that the editor has been induced to this publication: and to make it ſtill more generally uſeful, there is added a catalogue, in generical order, in Engliſh and French, of the names of all the *birds*, *beaſts*, *fiſhes*, *inſects*, *plants*, &c. &c. contained

tained in the ſaid Natural Hiſtory; which has the peculiar advantage over all other works of that nature, to be original in its figures, as well as deſcriptions.

⁂ The numbers added to the articles in the Generical Catalogue refer to the plates in the Hiſtory where the ſubjects are deſcribed and figured.

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ESSAY I.

ON THE WISDOM AND POWER OF GOD IN THE WORKS OF CREATION.

CHAP. I.

THE wiſdom and power of God are manifeſt to all rational creatures, from a contemplation of his wonderful works in the creation of this world: He hath formed every beaſt of the field, bird of the air, and fiſh of the waters: He hath alſo formed every tree and plant; every creeping inſect was made by him. All that the earth, air, or waters produce, were created by God's power. Now, as man is the only rational being in this world, it ſeemeth plain, by natural light, that the dominion of all creatures was given to him by God; therefore, ſince man's obligation to God is greater than that of any other creature, his acts of humiliation, adoration, and gratitude, ought to be, in ſome degree, proportionable to the favour and benefits he hath received. Amongſt the many acts of gratitude we owe to God, it may be accounted one, to ſtudy and contemplate the perfections and beauties of his works of creation. Every new diſcovery muſt neceſſarily raiſe in us a freſh ſenſe of the greatneſs, wiſdom, and power of God: He hath ſo ordered things, that almoſt every part of the creation is for our benefit, either to the ſupport of our being, the delight of our ſenſes, or the agreeable exerciſe of the rational faculty. If there are ſome few poiſonous animals and plants fatal to man, theſe may ſerve to heighten the contrary bleſſings; ſince we could have no idea of benefits, were we inſenſible of their contraries; and ſeeing God has given us reaſon, by which we are able to chooſe the good and avoid the evil, we ſuffer very little from the malignant parts of the creation.

God hath given to brute animals a certain law whereby to govern themſelves, which is called Inſtinct; it being an inward implanted tendency to particular actions, from which they cannot ſtray. This inſtinct, or inward force, appears to be ſtronger in brutes than in the human ſpecies, and ſupplies to them the defect of reaſon. Man hath an inſtinct alſo, but much weaker than that in other animals: to make up that want God hath given him a glimmering of that heavenly light called Reaſon. Now, as man was deſigned lord of this lower world, and the poſſeſſion of every part thereof was given to him, the inſtinct of brutes would not have been ſufficient; nor would reaſon itſelf have been enough without ſome inward appetites; for without inſtinct his generation would probably have ſoon been at an end; and we ſhould have neglected the ſupport of our individual bodies, had we only reaſon, and not hunger to tell us, that eating was neceſſary to life.

Reaſon is our director when we change our country from one extreme climate to another: The Ruſſian, though incloſed in houſes, firmly ſecured againſt the penetration of the cold air, and inwardly heated with ſtoves, when he travels into Perſia and India, is directed by the ſame reaſon to ſleep in the open air, and on the tops of houſes, and to uſe machines to agitate and bring freſh air about him; and, on the contrary, the Ethiopian, though his lodging be in the open plains and deſarts, and he without any clothing, yet, when he is brought to Europe, he is glad to ſcreen himſelf in warm houſes, and warm himſelf by fires, and cover himſelf with thick clothing. Reaſon giveth man this pre-eminence over brute beaſts; by it he can make almoſt all parts of the world habitable to him by arts and inventions to ſcreen himſelf from the great heats in ſome parts, and defend himſelf from the piercing colds in other parts of the world. No brute animal can thus indifferently inhabit any part of the world, becauſe their innate laws are unchangeable, and accommodated only to ſuch climates as nature has placed them in; ſo that I believe there is no creature whoſe race is ſpread in all habitable parts of the world as is that of the human ſpecies. Each animal ſeems to have his appointed climate, out of which, if he be removed to one far different, his generation ceaſeth, or looſeth its firſt properties; whereas ſuch creatures, as continue where nature placed them, hardly vary at all from the ſpecies from which they ſprang, preſerving the ſame magnitude, form, and colours throughout all ages; for it ſeemeth as if God had ſet particular marks of diſtinction on each ſpecies, from which they cannot ſtray.

From this reaſon I found the agreement between each different generation of animal and plant, which always continues to bear the form and likeneſs of thoſe in which they were firſt incloſed. Indeed ſome domeſtic animals and plants differ, in ſome ſort, from their firſt parents, which were ſavage. I take theſe differences not to be very material, and to proceed from the unnatural food, habitation, and other circumſtances that may alter the plant or animal in magnitude or colour; which is not material, ſeeing theſe things, ſo made domeſtic, if turned again to their native habitations,

tations, in a generation or two caſt off thoſe accidents attained by unnatural ſituations, and recover their firſt forms and colours ſtamped on them in the firſt creation of the whole ſpecies.

CHAP. II.

MANY who have wrote in former times on nature, ſuppoſe that all things, which were at firſt created by God on this globe, have been ever ſince, by his Providence, continued through an implanted ſeminal power down to theſe times, and will continue as long as the earth endureth: yet ſome great naturaliſts in theſe days are quite of a different opinion, and their reaſons for theſe opinions are founded on the great variety of foſſil ſubſtances found daily in many parts of the world, reſembling animals and parts of animals now in being, as well as animals and parts of animals not to be met with by the moſt laborious ſearches of the curious.

From the general face of things we may ſafely conclude there have been great revolutions on the face of this earth, which in many places ſeem to have been cauſed by a great quantity of water prevailing, and paſſing very ſwiftly over its ſurface, breaking up its lower parts, and rearing

ing them into mountains, and carrying other parts which have lain high into the ſea; ſo that in many places we find buried, in high mountains far inland, ſubſtances which received their firſt formation in the ſea, and in ſome low grounds, deep buried near the ſea, we find many things that received their firſt forms in the mountains. It is probable ſome of theſe great revolutions might be ſo wide ſpread at once, as utterly to extinguiſh ſome animals that were in God's original creation of this world.

If we conſider the beautiful parts of nature, ſo far as they charm the ſight by the luſtre and variety of colours, and the fineneſs of the texture of parts, I think many will agree, that the fine things produced may charm the eye, as much as the moſt ſtudied and harmonious compoſitions in muſic can charm the ear. But it is common to ſay, that people who have no delight in muſic, have no ear: And I think, we may as juſtly ſay of thoſe, who are not moved to admiration when the beauties of nature preſent themſelves, that they want eyes. Whether or not nature deſigned the beautiful forms and colourings we perceive in ſeveral kinds of inſects and other animals, as things to delight and pleaſe the ſenſe of thoſe animals, and others of the brute creation: Or whether they were deſigned principally for the delight and contemplation of man the lord of this lower world, is a queſtion. A reaſon, in my opinion, why inſects are not ſenſible of their own beauty, is the form of their eyes, which let in the light through a kind of net-work, which muſt diſcover the objects in a confuſed manner; or if we ſuppoſe each little part a diſtinct eye, they are ſo ſmall that an object muſt almoſt touch them to be diſtinctly perceived in its parts, and the quantity taken in at once ſo ſmall, that the entire form of one inſect can hardly appear plain to another; theſe eyes may indeed ſerve them to diſtinguiſh opake bodies from the clear air they fly in; and, when they approach very near, to pick out ſmall particles lying on leaves and fruits, which ſupply moſt inſects with food.

Now, as the eyes of man ſeem to be more adapted than thoſe of inſects to receive the various forms and colours of natural things, I am of opinion, that God principally deſigned theſe things, not only to pleaſe and delight the outward ſenſes of man, but that the contemplation of them ſhould point out to the mind the ſurpriſing manner of God's method of working who created all things; and this may ſerve as natural arguments of his infinite wiſdom and power.

Mr. *Horſley*, in his *Britannia Romana*, making a ſort of apology for that work in his preface, has theſe words, which will not be amiſs to quote for my preſent purpoſe. "I have always look-
"ed on it as an inſtance of divine wiſdom, that
"it ſhould be ſo ordered that different men have
"ſuch different taſtes and inclinations. By this
"means the ſeveral parts of knowledge are more
"cultivated: And I think we owe our thanks
"to any one who will apply himſelf to the
"ſtudy of any particular thing, though it ſeem
"minute, and may not ſuit our taſte or inclina-
"tion to purſue it ourſelves. This gives us, at
"leaſt, an opportunity of knowing, on eaſier
"terms, what can be ſaid on that ſubject."

It is always neceſſary that every age ſhould labour to diſcover ſomething, and not ſit down content with the diſcoveries of our forefathers; for experience ſhews, that the knowledge of our anceſtors dwindles away, and decays daily; for ſuch is the nature of time, that it obſcures or deſtroys the knowledge of paſt ages by the many waſteful events which happen in a long courſe of years, ſuch as fire, rapine, inundations, loſs of the liberties of countries, and many other things. But, more than all theſe, the change of languages affects our knowledge; for no language continues the ſame for many centuries: inſcriptions indeed have continued ſome thouſands of years, but when the languages are dead in which they are wrote, the ſenſe of them by ages becomes darker and darker, till at laſt they are utterly obſcure, as we find the moſt ancient are; witneſs the monuments of the ancient Egyptians, the ruins of Perſepolis, Palmyra or Balbeck, and many others in divers parts of the world which have almoſt outlived their deſcriptions; ſo that we cannot depend on the knowledge of the ancients as a perpetual fund; but muſt gather what we can from them, and add to it as much as we can of our own, that the ſtock we have may be kept up by adding ſomething in the room of what muſt inevitably be loſt; for if we ſit down content with what is already known, which is a knowledge evidently decreaſing every day, in a few ages we may know nothing, and be reduced to a ſtate equal to the wild Americans, ſince we know that Europe itſelf hath been well nigh reduced to ſuch a ſtate a few centuries ago, by falling into a ſuperſtitious lethargy, neglecting all farther improvements of knowledge, and deſpiſing reaſon, nature, and the evidence of ſenſe.

Every one ought to attain to as high a degree of natural knowledge as he can, for a deep knowledge in nature has detected many falſe pretenders to inſpiration, propheſy, and the like, while the ignorant in nature and her laws have been deluded by the meaneſt and loweſt pretenders, ſuch as diabolical poſſeſſions, fantaſtical apparitions, dreams, good and bad omens, and the like.

As arts have been brought by gradual ſteps, from one degree of perfection to another, by joining the knowledge of paſt times, left us in the writings of thoſe that are gone before, with the diſcoveries and experience of the preſent times, ſo even the knowledge of nature itſelf hath been multiplied by the various degrees of conception, and different powers of penetration that have been given by God through paſt ages to mankind, which have been handed down through the records of time to us. Without this knowledge of other men joined to our own, our knowledge would be like that of ſavage people who live together in ſmall tribes or families, and have nothing but mere mother wit and pure natural capacity, chiefly derived from the ſenſes, to direct them, they not knowing what any of their anceſtors ſaid or thought before them for want of characters to expreſs words; ſo that each man's knowledge is his own, or has little aſſiſtance from others: I do not mean, that, while we are ſearching into nature's works, we ſhould neglect the curious arts and inventions of men; for by being well ſkilled in arts we are enabled the better to make diſcoveries in nature. Beſides, a fine art loſt may never be recovered; but nature, though at preſent unknown by ſearching, may at one time or other be found, becauſe ſhe always endureth and continueth the ſame. Art and nature, like two ſiſters, ſhould always walk hand in hand, that ſo they may reciprocally aid and aſſiſt each other.

CHAP. III.

MAN, when he beginneth to exerciſe his rational faculties, ought to ſet before his intellectual mind the ideas of truth and falſhood, and endeavour to find out, in the moſt ſtrict and abſolute ſenſe, what they are; and, when he hath found them, he ought to govern all his actions by the former, and avoid the latter: but it is exceeding hard to diſcover what truth is in a world of falſhood and controverſy, where all of us ſuck in error with our milk. Is not great part of the world taught to believe, that their ſenſes are liars, and that things which appear to be the ſame, to the ſtricteſt ſcrutiny of our ſenſes, are really and abſolutely quite otherwiſe? Many we know ſuffer themſelves to be led into ſuch inconſiſtent beliefs as theſe; but it is a fixed and firm article of my private faith, that God hath given us our ſenſes as a touchſtone of truth; and that when any writing, tradition, or bold aſſertion, advances any opinions, that directly and flatly contradict the ſenſes which God hath given us to judge by, they are abſolute falſhoods, and ought to be rejected of all mankind. If we can diſcover what truth and falſhood are really, we then have grounds to reflect upon, and may form our reflections into reaſonings; but what right reaſon is we ſhall find it more difficult to diſcover, than what is ſimple truth and falſhood: for our conceptions of matter, being only what enter by the dark doors of our ſenſes, are, when entered, to one man one thing, and to another quite a different thing, which maketh human reaſon ſo fallacious and various; for our reaſon proceeding from ſenſe, and ſenſe being different, or receiving different ideas from the ſame object by different men, it follows of neceſſity, that there is no ſuch thing abſolutely as a general human reaſon, which is right and the ſame, the ſtandard of which may be conveyed by writing, or tradition, from one age to another; but that every man hath his own particular reaſon, which is different in men according as God hath given them ſtrength or weakneſs in their underſtanding to judge of ſuch things as enter by the ſenſes. It ſeemeth to me, that in various men the ſenſes differ infinitely; for that colour which is a favourite in the eyes of one, is indifferent or diſagreeable to another; which, perhaps, may proceed from differentt inctures in the cryſtalline humour; and ſome ſounds are indifferent, or perhaps diſpleaſing to ſome, though they fill others with the higheſt rapture. Men vary in the ſame manner in the ſenſes of touching, taſting, and ſmelling: human reaſon alſo receives other impreſſions (which generally cleave too faſt to it) ſuch as proceed from the different educations, religions, and cuſtoms of different times and places. For all who have ſeen but a little of the world know how very different the general reaſonings of one country are from thoſe of another; and he who has been ſlightly converſant in hiſtory but a few ages backward, will find, that the opinions and reaſonings of the ſame place and people, in an age or two, are quite transformed and changed; ſo that I cannot ſee that we have, in our imperfect ſtate, any ſuch thing as right reaſon founded on demonſtration, except in ſome few mathematical caſes, which muſt conſtrain the aſſent of all men. Therefore, we cannot certainly conclude on hardly any thing without controverſy, we muſt ſteer the beſt courſe we can, ſetting before our eyes truth as the port we endeavour to gain, which ought always to be our director in opinions and actions, in relation to God and man, as well as in our general practices and ſpeculations in the world.

He that would write any thing in general on nature, or on any particular natural ſubject, ought, ſo far as his faculties will permit him, to penetrate into its ſources, and trace it backward, if poſſible, to find out the firſt cauſe and mover of all things. If we conſider ourſelves, and the animal beings that inhabit the face of this globe, we muſt wonder, at firſt, how they came to be; but, when we think of the inſcrutable ſprings of life and motion, we muſt be aſtoniſhed to the higheſt degree, not knowing from whence theſe things ſpring: and we can ſolve theſe inconceivable things no other way, than by ſuppoſing there muſt exiſt ſome great, inviſible, inconceivable, all-wiſe, and all-powerful Creator; ſince the viſible creation is ſuſtained always, producing the ſame forms of natural things, which ſucceed from one generation to another, through the courſe of time; which could not be, if Chaos had prevailed, as ſome have taught; for were the immenſe maſs of matter without a living, all-powerful being to animate it, it muſt reſt without motion, or act by a fermentation which would always generate new and monſtrous forms. Now, ſince from natural light we have diſcovered a God of infinite power and wiſdom, whoſe attributes are all immenſurable and infinite, we cannot ſuppoſe his kingdom leſs than eternal; nor his ſpace, or matter, leſs than immenſe: by eternity I mean time, not as meaſured by the courſe of a planet in any ſyſtem, but a conſtant, continued ſucceſſion of duration, that ſhall know no end; by immenſity I mean the greateſt given quantity of matter, or ſpace, infinitely multiplied, which infinite multiplication will always fall infinitely ſhort of the immenſe quantity of matter; for if we caſt our thoughts beyond this lower ſyſtem, and dive into the endleſs depths of ſpace, we are utterly loſt; becauſe the height, depth, and extenſion on all ſides, flies away infinitely faſter, and more diſtant, than the ſwifteſt and moſt extended thought can follow. As the greateſt part of matter is to be multiplied without end, ſo is the leaſt part of matter to be divided infinitely, notwithſtanding the falſe doctrine of atoms, the leaſt or indiviſible parts of matter, and the ſeeming contradiction of infinite numbers contained in finite ſpace; for God, by his power, can as eaſily pierce infinitely into a ſmall thing, as extend his dominion through the regions of immenſity.

On this principle of infinite number contained in finite ſpace, I ſuppoſe that God, by one act of his will and power, created the firſt living and individual principle of every ſingle, generating, created being, that hath made, or ſhall hereafter make its appearance in the world: theſe living and individual principles, being incloſed one within another infinitely, were placed in the firſt viſible individuals of each ſpecies; and it is the work of time and generation gradually to bring to light the incloſed and hidden principles, which, as their progenitors decay and fall off, extend themſelves to their natural deſtinated ſizes, in order to keep up a conſtant ſucceſſion of each ſpecies. The preciſe exactneſs of ſize, colour, ſhape, and other conditions of animals and plants, which they have retained in all ages, wherein hiſtory hath given us any account of them, hath induced me to believe, that all the individuals of each ſpecies were produced at the ſame time, by one act of the will and power of God. The animalcula diſcovered in the *ſemen maſculinum* of all living creatures by the laborious M. *Van Leuwenhoeck*, in his microſcopical obſervations, and, ſince his time, confirmed by many others, is, I think, a ſtrong argument for the above opinion.

To proceed, and come a little nearer to my purpoſe:

If a man may be allowed truly to declare what ſpirit he is poſſeſſed with, as ſome of our modern enthuſiaſts have falſely, yet boldly done; I muſt confeſs, that a zeal for expreſſing natural things, with the utmoſt truth and preciſeneſs, hath always inſpired me, even to ſuch a degree, that I have ſometimes been afraid it would riſe to ſomething like what appears in bigots, who pretend to inſpiration; but as I never was a favourer of ſuch enthuſiaſtic or deſigning men, ſo I was always on my guard, leſt my natural reaſoning ſhould be corrupted by flights, of which I could give no ſatisfactory account to the common ſenſe and underſtanding of mankind.

CHAP. IV.

MAN is a creature too weak and imperfect to trace the works of the Great Creator in their juſt and natural gradations; yet he, with all humility and gratitude, ought to own, that, of all God's viſible creatures, he is under the greateſt obligations to his Creator, for having given to him the firſt place amongſt created beings in this lower world, and alſo the command, dominion, and rule over all the beings inferior to himſelf that cover the face of this globe, having even denied them the means of eſcaping from man's unbounded will and tyranny. The human race is not only thus ſuperior to the other creatures on this earth, but each particular man ſeems intended by his Maker to be equally free, and not ſubjected to the arbitrary will of any other man. Tyrants over men are the effect of popular depravity, vice, and unbounded ambition; and, when uſurped power perſecutes, oppreſſes, and tortures mankind beyond a degree of human ſufferance, a door is left open for their eſcape, which Providence has denied to brutes. The goodneſs of God to man is a myſtery our weakneſs can never unravel. We are all naturally tyrannical, and all ſeek and endeavour to gain power and dominion over each other. We, with regret, ſubmit to the ſuperior power of thoſe ſtronger or more powerful than ourſelves. Our compacts with one another ariſe from the mutual jealouſy and ſuſpicion each one has of his neighbour's villainy. Should a juſt, ſublime, and highly rational created being, far above the condition of man, condeſcend to give us a real hiſtory of ſome of our greateſt heroes, wiſeſt lawgivers, and canonized ſaints, what ſhocking ſcenes of lawleſs force, brutal cruelty, cunning, circumvention, deceit, vile hypocriſy, and ſacrilegious frauds, would ſuch a faithful hiſtory be filled with! It would certainly make men appear more infamouſly wicked, than men have made infernal ſpirits in the aerial hiſtories they have given of them.

If we would know what men are in a ſtate of nature, we may turn our eyes on deſpotic princes, and we ſhall ſee them acting without any law or conſcience to reſtrain them from what their natural inclinations dictate. To ſum up all the faculties of man, we muſt examine the whole brute creation, and take in all their qualities, ſuch as in man would claim the names of virtues or vices: and this will give us the various mixtures of virue and vice in the human ſpecies, in ſome of whom the virtues are predominant, and in others the vices, though none of them are without a mixture of both, and they are more or leſs virtuous or vicious in proportion to ſuch mixture.

Had man been created benevolent to all of his own kind, having no will or deſire to ſubdue or rule over others, or invade their property, and likewiſe endowed with a deſire to aſſiſt and help his weaker neighbour; had peace and tranquillity been inviolably maintained amongſt the whole race; the world, before this time, muſt have been ſo overſtocked with people, that it would have been impoſſible for them to ſubſiſt in it; and the animals, &c. which were given by God for the food of man and of each other, would have been nearly, if not quite extinct: for we know, that many of the wild animals require vaſt uninhabited plains, foreſts, and mountains, to breed, feed, and bring up their young. But Providence has ordered things otherwiſe, by putting enmity between man and man, and between nation and nation, in order to prevent the over-great increaſe of the human kind, which muſt conſequently have greatly leſſened, if not entirely extirpated, many of the animal ſpecies, before the ſtill increaſing number of men had proved their own deſtruction, which finally muſt have been the caſe: but it is reaſonable to believe, that Providence equally regards the preſervation of all the animals, &c. that are created.

Wiſe ſtates, that have ſuperſtitious and ignorant ſubjects, are often under a neceſſity of making ſuch laws as conſiſt little with reaſon, common ſenſe, or the natural liberties of mankind: they often are obliged by ſuch methods to ſtop the courſe of popular clamour, which would otherwiſe reduce a well-eſtabliſhed ſtate to anarchy and confuſion. The remedy againſt ſuch inconveniencies is a ſlack execution of ſuch bad laws. I believe, the wiſeſt of the human race do not expect to find real and abſolute moral juſtice and right amongſt the moſt honeſt and moſt experienced of their own ſpecies; for right and wrong, virtue and vice, &c. are differently underſtood, according to the different modes, cuſtoms, and religions of different countries, and different times in the ſame countries; though, in the unchangeable Divine Will, it would be great preſumption in us to ſuppoſe the leaſt variation or ſhadow of change. Divine juſtice and rectitude muſt be abſolutely and conſtantly the ſame; but, as we are in our nature very imperfect beings, our conceptions, words, and actions, muſt be all imperfect; inſomuch, that were ten of the wiſeſt amongſt men, living at the ſame time, and under the ſame government, to form a plan of moral, univerſal, abſolute rectitude in the conduct of human life, they would all widely differ from each other.

CHAP.

CHAP. V.

IN all countries, whether agriculture be promoted or neglected by mankind, nature aſſiſts to ſow and plant as well as to fertilize the earth. The ſeeds of lofty trees are many of them winged; and when they are ripe, the autumnal winds blow them off, and ſcatter them at a great diſtance from their mother plants: others are in pods, or huſks, and not capable of being carried by the motion of the air; but Providence hath given them as food to birds, who carry them to diſtant places, and in feeding ſcatter part of the ſeed in ſoils proper for them to take root in and ſpring up. Even the droughts of the autumn contribute to increaſe and propagate trees and plants; for by cauſing deep chinks or chaps in the earth, the ſeeds of trees, and larger plants, that require depth, are lodged at proper depths for their growth, and, at the ſame time, ſecured from ſuch animals as feed on them. The ſeeds of annual plants are, many of them, provided with a light down, by which they are enabled, with the help of the wind, to riſe to great heights, and ſpread themſelves very wide to propagate their ſpecies in diſtant lands. The ſun, by its annual viſits to the northern and ſouthern tropics, alternately gives action and reſt to vegetation. The floods, which in many countries fall at certain ſeaſons from the mountains, cover the plains, and enrich the ſoil by the ſediment of their waters. The winter's froſts alſo, by expanding the moiſture contained in the earth, looſen and break the clods, ſo as to make them give way to the ſpreading roots of vegetables : ſwine, moles, and ſome other animals, root up and looſen the earth, and fit it to receive the ſeeds of plants.

The Rev. Mr. Robinſon, rector of Ouſby in Cumberland, in his Natural Hiſtory of Weſtmoreland and Cumberland, part II. page 97, ſays, " that birds are natural planters of all
" ſorts of wood and trees : they diſſeminate the
" kernels upon the earth, which, like nurſeries,
" brings them forth till they grow up to their

"natural ſtrength and perfection." He ſays, "About twenty five years ago, coming from "Roſe-Caſtle early in the morning, I obſerved "a great number of crows very buſy at their "work, upon a declining ground of a moſſy "ſurface: I went out of my way on purpoſe to "view their labour; and I found they were "planting a grove of oaks. The manner of their "planting was thus: they firſt made little holes "in the earth with their bills, going about and "about till the hole was deep enough, and then "they dropped in the acorn, and covered it "with earth and moſs: the young plantation is "now growing up to a thick grove of oaks, fit "for uſe, and of height for the crows to build "their neſts in. I told it to the owner of the "ground, who obſerved them to ſpring up, and "took care to ſecure their growth and riſing. "The ſeaſon was at the latter end of autumn, "when all ſeeds were fully ripe."

Mr. Robinſon ſeems to think, that Providence had given the crows this inſtinct ſolely for the propagation of trees; but, I imagine, it was given them principally for their own preſervation, by hiding proviſion in time of plenty, in order to ſupply them in a time of ſcarcity; for it is obſerved, in tame pyes and daws kept about houſes, that they will hide their meat when they have plenty, and fetch it from their hiding-places when they want it: ſo that ſuch an inſtinct in theſe birds may anſwer a double purpoſe, both their own ſupport in times of need, and the propagation of the trees they plant; for, wherever they hide a great number of nuts or grain in the earth, we cannot ſuppoſe they find them all again, but that as many will remain in the plat of ground they make uſe of, as can well grow by one another. Nature hath been amazingly bountiful in the wonderful increaſe of ſeeds in many vegetables; inſomuch that, with proper culture, the face of the whole earth might be covered, from the ſeeds of a ſingle plant, in a very few years. The ſeminating power in animals alſo equals, if not exceeds, that of plants: if we examine ſome of the fiſhes and inſects, we find what great numbers of their ſpecies they are able to produce.

But all theſe great increaſers are liable to perpetual deſtruction, they being the natural food of other animals, and of one another: the larger animals of prey, who are not liable to be thus deſtroyed, increaſe very ſlowly.

CHAP. VI.

IT is not at all neceſſary, convenient, or poſſible, that a whole civil ſociety, or commonwealth, ſhould be learned, greatly knowing, or experienced: it is neceſſary, indeed, that ſuch as are intended for the ſtudy and practice of deep ſciences, ſhould be taught ſeveral of the dead languages, the better to enable them to join the knowledge and experience of paſt ages and diſtant countries to that of their own. Politicians, prieſts, phyſicians, lawyers, hiſtorians, &c. cannot be in any degree perfect, without the fund of ſcience preſerved in ancient authors. The mercantile part of ſociety, of the ſuperior claſs, need not be at the pains, unleſs they chuſe it, to acquire any of the dead languages; but three or four of the living languages of Europe will be neceſſary to fit them for an extenſive traffic, and raiſe them to the high fortune and reputation in which they ſtand amongſt us; for, I believe, it may as juſtly be ſaid, that our merchants are princes, as it could have been ſaid of any merchants in ancient times. The like accompliſhments may aſſiſt many of the middling order of tradeſmen. But, as to the lower claſs of trades, ſuch as handicrafts, farmers, mechanics, &c. their mother-tongue is ſufficient for all their purpoſes; but it is neceſſary that they ſhould read their own language, and acquire ſuch a knowledge of figures as may enable them to keep common accounts. As to the loweſt claſs, ſuch as common labourers, peaſants, and that part of the people called the poor, it is not needful that they ſhould have any ſort of learning, except what may inſtruct and forward them in their various labours: it is ſufficient that they are inſtructed in the moral and religious rights of their country, by perſons whom the policy of the ſtate, under which they live, has appointed for that purpoſe. Thus would the orders of men be kept diſtinct, and labouring people would not be wanting to perform the loweſt offices in ſociety. A wrong policy prevails with us at preſent under the name of charity. Our middling people, through a ſhort ſightedneſs, give education to the children of the loweſt claſs, above what the employments they ought to be bred up to can require: this robs the public of labouring people, and ſets theſe children upon an equality with thoſe of their benefactors, which muſt conſequently hurt the benefactors children, by increaſing the number of their order; for many of theſe children of the poor, when thus educated, will, in the riſing generation, out-ſtrip, circumvent, and diſplace the children of their benefactors, at a time when few of the benefactors themſelves are living to ſee the conſequences of their miſtaken charity. To ſupport the poor in times of neceſſity, and to inſtruct and train their children in a habit of induſtrious labour, is real charity; and its conſequences tend to the good of ſociety. Men of great eſtates, I think, ſhould be educated in proportion to their fortunes, and above thoſe of the middling people; becauſe out of ſuch are generally choſen the governors and directors of ſtates, as well as thoſe who act as magiſtrates in their ſeparate diviſions; ſuch ought to have knowledge and experience above that of the bulk of mankind whom they are deſigned to govern. As to gentlemen who have made the chace their ſole pleaſure, and deſign to breed their ſons to the ſame occupation, it is needleſs that they ſhould have a better education than that of their tenants, the farmers, who are generally their companions; for it requires very little knowledge to enable a man to break his neck in the purſuit of deer, hares, foxes, &c. and in leaping over hedges, ditches and gates.

As I have no deſign to publiſh any thing more in Natural Hiſtory, theſe eſſays being chiefly extracts from my great work in ſeven volumes in quarto *, my petition to God (if petitions to God

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* Mr. EDWARDS's Addreſs to the Public on the Sale of his Works to Mr. ROBSON.

College of Phyſicians, Warwick-Lane, May 1, 1769.

To the Nobility, Gentry, and Curious in general.

HAVING this day ſold and delivered to Mr. JAMES ROBSON, bookſeller in New Bond-ſtreet, all the remaining copies of my Natural Hiſtory of Birds, and other rare and undeſcribed Animals, Quadrupeds, Reptiles, Fiſhes, &c. &c. in ſeven volumes quarto, French and Engliſh, printed upon a fine royal paper, containing ſix hundred diſtinct ſubjects, engraved upon three hundred and ſixty-five copper plates, from deſigns copied immediately from nature, and coloured under my own inſpection; together with all my copper plates, letter-preſs, and every article in my poſſeſſion relative to it: I have thought it a duty incumbent upon me, in juſtice to the public, as well as the purchaſer, to declare that all future publications of the ſaid natural hiſtory are the ſole right and ro-

God are not preſumptuous) is, that he would remove from me all deſire of purſuing Natural Hiſtory, or any other ſtudy, and inſpire me with as much knowledge of his Divine Nature as my imperfect ſtate is capable of; that I may conduct myſelf, for the remainder of my days, in a manner the moſt agreeable to his will, which muſt conſequently be moſt happy to myſelf. What my condition may be in futurity is known only to the Wiſe Diſpoſer of all things: yet my preſent deſires are (perhaps vain and inconſiſtent

property of Mr. Robson: and that my labours may be handed down to poſterity with integrity, truth, and exactneſs, I have delivered into his hands a complete ſet of the plates, highly coloured by myſelf, as a ſtandard to thoſe artiſts who may be employed in colouring them for the future.

As the remainder of my life will be chiefly ſpent in retirement, I beg leave to return my moſt grateful acknowledgments to the nobility, gentry, and public in general, for all their favours, and generous ſupport, during the tedious period of all my publications; and am with the greateſt truth and reſpect,

Their faithful and obliged

Humble ſervant,

Geo. Edwards.

†‡† The public may always depend upon having of Mr. Robson, Mr. Edwards's Natural Hiſtory, 7 vols quarto, carefully coloured, at the uſual price of fourteen guineas half bound, or at a proportionable price in any elegant binding.

with the nature of things !) that I may become an intelligent ſpirit, void of groſs matter, gravity and levity, endowed with a voluntary motive power, either to pierce infinitely into boundleſs etherial ſpace, or into ſolid bodies ; to ſee and know how the parts of the great univerſe are connected with each other, and by what amazing mechaniſm they are put and kept in regular and perpetual motion. But, oh vain and daring preſumption of thought ! I moſt humbly ſubmit my future exiſtence to the ſupreme will of the One Omnipotent.

If men, in the preſent age, at the concluſion of their poetical, hiſtorical, or other works, ſhould vaunt and promiſe themſelves immortality, as many of the ancients ſeem to have done, I believe it would only ſerve to render them ridiculous, and depreciate rather than enhance the value of their peformances : nor can I believe that the ancients were openly ſo vain or ſelf-conceited, as to promiſe themſelves immortality in ſuch a glaring manner ; but I rather imagine, that thoſe vain flouriſhes were added by their enthuſiaſtic admirers, in the copies that were made after the death of the authors. Our incomparable Shakeſpear was far from expecting an immortal name: witneſs the following quotation from his works:

> The cloud-cap't tow'rs,
> The gorgeous palaces,
> The ſolemn temples,
> The great globe itſelf,
> Yea, all which it inherit,
> Shall diſſolve; ——
> And, like the baſeleſs fabric of a viſion,
> Leave not a wreck behind.

What may be the future fate of my NATURAL HISTORY, I cannot pretend to judge: but conſcious of having endeavoured to become a uſeful member of ſociety, I ſubmit it to the critics, correctors, tranſlators, regravers; and laſtly, if it deſerves no better fate, to obſcurity and utter oblivion.

ESSAY II.

ON NATURAL HISTORY; AND CHIEFLY ORNITHOLOGY.

CHAP. I.

NATURAL Hiſtory cannot, in any degree, be perfect without figures; therefore I think we ſhould promote drawing in all ſuch young people who ſeem to have a liking to it; no one need think it an amuſement beneath his dignity, ſince our preſent royal family, and many of the young nobility, have been inſtructed in that art. Every one who conſults ancient authors is very ſenſible of their deficiencies in the want of figures; for many things are mentioned by a bare name, without any deſcription or figure; and great phyſical virtues, and other uſes, are attributed to ſome of theſe things ; but there being no certain marks to ſhew what things in nature were called by thoſe names, we have now wholly loſt them, or take different things for them, or are in diſpute about them ; therefore authors, naturaliſts eſpecially, ſhould conſult, firſt of all, the outward forms of things, in order farther to explain them by deſcriptions and other marks ; and deliver them down to poſterity, ſo as to free them, as far as human reaſon is capable of, from the loſſes and injuries they may ſuſtain from time. In deſcribing natural things nothing ought to be omitted that is any way remarkable ; and may fix and eſtabliſh the character of the thing deſcribed, ſo as plainly to diſtinguiſh it from all other things : this may be done without following the minute ſteps of ſome authors, who have wrote large books on ſingle birds or plants ; for long deſcriptions lead the mind into mazes and confuſion, and tire rather than inſtruct. On the other hand, too brief deſcriptions ſhould be avoided ; for very often theſe are found to conſiſt only of ſuch general forms and colourings that are common to many things of the ſame genus with the thing ſo briefly deſcribed, which makes the deſcription uncertain, or rather no natural deſcription at all. If naturaliſts would obſerve this medium, and ſtudy a plain comprehenſive language, and well expreſſing the things treated of, they might gradually, by making the ſtudy both uſeful and pleaſant, bring many into the love of natural hiſtory who now deſpiſe it.

I know there are ſome gentlemen that put the terms of mean and little upon ſuch ſciences or ſtudies that they themſelves have no taſte for; and others would make them uſeleſs by calling them mere ſpeculations. Natural hiſtory has been particularly aſperſed and treated in this manner by the enemies to all real knowledge, their ideas, or conceptions, reaching only to ſuch objects and purſuits as produce immediate profit or ſenſual pleaſure: but if theſe gentlemen will look back a little, they will find that men as great, as wiſe, and magnanimous, at leaſt, as themſelves, in all ages, have buſied themſelves in the diſcoveries and knowledge of nature. King Solomon is a great example in this matter, who was himſelf a natural hiſtorian, and perhaps had penetrated farther into nature than any one has done ſince. Alexander the Great was remarkable for encouraging all the fine arts, as well natural hiſtory as other literature, without which his memory could not have ſubſiſted till this time. But to come nearer our own times, Lewis XIV. of France, though one of the greateſt princes of the age he lived in, and engaged in ſeveral wars for a conſiderable part of his life, yet found time to improve his mind by the ſtudy of the fine arts, and eſtabliſhed an academy for the farther improvement of arts and new diſcoveries in nature : he was ſuch a lover of the productions of nature, that he made gardens, and built magnificent ſtoves, &c. for the reception and raiſing of all exotic plants; and built at Verſailles, near his palace, an elegant and curious place called the *Managery*, with large apartments and conveniencies for living animals from all parts of the world ; and not only rare pictures and ſculptures of the greateſt maſters were collected in his cabinets, but ſeveral extraordinary productions of nature. Auguſtus the late king of Poland was alſo a great encourager of natural knowledge, and had made a large collection of natural productions from moſt parts of the world.—To come ſtill nearer, even to our own times, his preſent majeſty king George III. has, with a liberality and munificence equal to the Auguſtan age, become the patron and enourager of the ſciences and arts; and generouſly founded and endowed an academy of drawing, painting, architecture and ſculpture. The numerous and noble collection of paintings, manuſcripts, and books in all languages and ſciences, (but particularly in natural hiſtory) together with all kinds of natural and artificial rarities and curioſities collected by his majeſty from all parts of the world, in the courſe of a few years, will deſervedly rank the king of Great-Britain's cabinet with that of the greateſt princes of Europe.

They who draw after nature, on account of natural hiſtory, ſhould repreſent things juſtly, and according to Nature, and not ſtrive to exalt or raiſe her above herſelf; for by ſo doing, inſtead of inſtructing, they will lead the world into errors; nor can the works of two authors on the ſame ſubject ever agree. The hiſtorical painter, eſpecially he who would repreſent the fictions of the poets, may take greater liberties, and ſtudy by all methods to elevate his ſubject by adding the higheſt ſtrokes of art, in order to pleaſe the eye, and raiſe in the mind ideas equal to the hiſtorian or poet he would repreſent: yet every one who reads natural hiſtory, and ſees figures and deſcriptions of things in nature, ſuppoſes they are, or ought to have been immediately drawn and deſcribed from nature. But no experienced man, when he beholds an hiſtorical piece, ſuppoſes the figures there drawn are like to thoſe they are intended to repreſent either in feature or perſon, any farther than in general the hiſtorian or poet may have told us, that one man was a graceful perſon, another a little crooked or deformed; which accidents a painter has liberty to carry to what degree of perfection or imperfection he can conceive, provided always he doth not contradict the letter of his hiſtorian. But in drawing after nature, a moſt religious and ſcrupulous ſtrictneſs is to be obſerved; and by this means only we can demonſtrate, that nature is or is not the ſame through all times. If natural hiſtorians, or they who draw for them, would carefully obſerve theſe rules, ſome of them might, perhaps, produce figures that would be deemed perfect by the knowing naturaliſts of theſe times, and eſcape their cenſure; then might they, like the celebrated ſtatues of the ancient Greeks and Romans, paſs down as models to future ages, as things juſtly and truly repreſenting nature; but theſe things are rather to be wiſhed for than expected.

I have been as perfect in my Natural Hiſtory as the nature of the thing will admit of, in order that it may be added to a new general Ornithology (which, I think, is wanting) in caſe any one fit for the taſk ſhould undertake it. It may not be here improper to give my thoughts on that ſubject, the ſtudy of which has lain dormant for many years: I know no Engliſh author who has wrote any thing conſiderable ſince Mr. *Ray* reviſed *Willoughby*'s manuſcript Hiſtory of Birds, which was publiſhed anno 1678, till of later years Mr. *Ray* hath added ſome few, which ſee in his *Synopſis Method. Avium*, &c.

where he has mentioned the authors from whom he collected them. The Memoirs of the Academy Royal of Paris, on ſuch an occaſion, ought alſo to be conſulted, where ſomething new may be collected. Mr. *Cateſby*, in his Hiſtory of Carolina, &c. hath figured and deſcribed upwards of a hundred rare birds, the greateſt part of which would come into a new hiſtory, being moſtly non-deſcripts. *Albin* hath publiſhed a great many, I think upwards of 300 figures; but, they being chiefly collected from *Willoughby*, a compiler muſt look cautiouſly on him; what new birds he has worthy of any notice are from Mr. *Dandridge*'s collection, the originals of which I have ſeen, and could wiſh *Albin*'s copies after them had been better; for what is well done after nature itſelf will be always valuable. *Albin* has given ſome draughts of birds, which, he ſays, were from Sir *Thomas Lowther*'s collection; but I am very doubtful as to them, they being taken from drawings done by ſome very mean peformer, which *Albin* has not thought proper to confeſs. By accident I happened to meet with ſome of theſe drawings, which has confirmed me in the truth of what I ſay. The natural

Hiſtories we have had in England, till of late years, are moſtly tranſlations from other languages, which has rendered the underſtanding of them ſomewhat difficult; for I believe it altogether impracticable to make a tranſlation run ſo ſmooth and intelligible as the original from which one tranſlates, without loſing a good deal of the true ſenſe and meaning of its author. This we daily diſcover in tranſlators, who are forced, in ſome particular parts, to give the words of the firſt author in the margin, becauſe they cannot be intelligibly rendered in the language of the tranſlator; ſo that being in its original language is always an advantage to a book, becauſe tranſlations muſt neceſſarily, at leaſt in ſome ſmall degree, give the readers of them different ideas from the originals. My Natural Hiſtory hath the advantage to be original in its figures, as well as its deſcriptions; not one of the former being copied from others, or the latter either tranſlated or tranſcribed.

We are much deceived by people who ſhew foreign birds and beaſts; for they, to make them ſeem more rare, often pretend them to be natives of places very diſtant and unknown, by which, not only the ignorant, but ſometimes the more knowing, are deceived; and, to ſtrike us with ſurpriſe, they pretend that to be a fierce, ſavage and untameable creature, which in its real nature is very gentle and harmleſs. From ſuch impoſitions proceeds the vulgar opinion, that the porcupine is a fierce beaſt, and that it can kill by ſhooting its quills, though indeed he is a beaſt of the more gentle and harmleſs kind. I believe there are few obſerving people, that are any way curious, but muſt have detected ſome of their cheats. Many African birds have got the name of Americans amongſt us, becauſe they generally come to us from the Weſt-Indies; they being firſt brought thither from Africa in ſhips, which trade in Negroe ſlaves, and preſented by captains to governors and planters in America, from whom they are often ſent into England as preſents to the nobility and our London merchants, without mentioning their being natives of Africa, by which miſtake many birds are aſſerted to be natives of countries where they were not bred. Therefore, ſince it is not always poſſible to gain ſuch full and perfect accounts as one could wiſh, I think no man ſhould be diſcouraged from publiſhing accounts of natural things, becauſe he cannot give ſo full an account of them as he deſireth; for it is enough in a faithful author, if he can give but a tolerable account of things which we have not heard of before, or a clearer hiſtory of things we have yet known but obſcurely, which may give a later ſearcher opportunity to diſcover things more perfectly; for it is altogether impoſſible in many caſes, at firſt, to come to the knowledge of things in all their particular circumſtances. It is the work of ſome only to hint to us what there is in nature, barely by names; and of others, to ſearch a little farther, and give ſome tolerable account of them, which may enable others, who come after, to attain a more perfect knowledge of things, who, perhaps, would never have buſied themſelves about them, had they not received their firſt hints from authors far more dark than themſelves. In natural productions we often meet with rare things brought from diſtant parts of the world, which have lain in obſcurity, unregarded by any knowing perſon, till it is forgotten from whence they were produced: when ſuch things are diſcovered, I think it better to preſerve figures and deſcriptions of them, than to let them ſink in oblivion, to which they were haſtening; becauſe, when we certainly know that theſe things ſubſiſt in nature, the curioſity of ſome will be incited to inquire after them, in order to make more full and perfect diſcoveries. Sir *Francis Bacon* has left us ſomething in his Advancement of Learning, pointing out the means of improving ſcience (which is, I think, ſuitable to our preſent argument) in the following lines: "Thoſe things are to be held poſ-"ſible, which may be done by ſome perſon, "though not by every one; and which may be "done by many, though not by any one; and "and which may be done in ſucceſſion of ages, "though not within the hour-glaſs of one man's "life; and which may be done by public de-"ſignation, though not by private endeavour."

One is ſomewhat conſtrained in Natural Hiſtory, having only one figure of each ſpecies, to keep to ſuch attitudes in figures as will ſhew all their principal parts and colours treated of;

otherwiſe the figures and deſcriptions together would not be ſo agreeable to ſome readers. Therefore many ſuch actions, turns, and foreſhortenings, which make up the agreeable variety of maſterly compoſitions, muſt be avoided, leſt they hide what is moſt conſpicuous in the natural deſcriptions.

In colouring after nature one ſhould be careful that the lights be not made too light, eſpecially where ſubjects are of dark colours, becauſe it may deceive thoſe whom we deſign to inform, by making them believe thoſe ſubjects are lighter coloured than they really are in nature; every indifferent judge not conſidering that an artiſt cannot expreſs the fullneſs of light and ſhadow in a picture, as they appear in natural objects: For example, what man can expreſs the fullneſs of a ſhadow in an object that is wholly black; for the paper or canvaſs the object is drawn on, muſt be expoſed to a good light to ſhew it advantageouſly to the eye, by which means the blackeſt ſhadow one can make will appear as light as the higheſt light of the ſame black object placed in the ſame degree of light; ſo that we are conſtrained to raiſe our lights in ſuch objects ſomething above their appearance in nature, otherwiſe all would be flat; for as we cannot make the ſhadows ſo dark as they appear in nature (ſhadows in painting being expoſed to a ſtrong light) ſo conſequently our lights muſt be lighter than they appear in nature, that there may be the ſame proportion between light and ſhadow in pictures as there is in natural objects; but an exceſs of light ought to be avoided, otherwiſe in painting a black object, we may give the beholder rather an idea of grey. In painting objects perfectly white, you have not the advantage of raiſing your lights above what your natural object preſents, ſo that in pictures there cannot be ſo great a difference between dark and light objects, as in natural bodies: this way of reaſoning in relation to painting might be carried to a great length. I formerly imagined it poſſible, by the higheſt perfection in the art of painting, to deceive the eye, by performing what might be taken for nature; but, ſince I hit on the above reaſons, I plainly diſcover it to be impracticable. I have obſerved, that rude ſcene paintings in theatres are more deceptive than more finiſhed works; but this proceeds from the diſtance and lamp light in which we view them.

It is obſervable, that there are birds peculiar to ſome particular tracts of land, which will not propagate or ſpread themſelves into other countries, though in the ſame latitude, and on the ſame iſland, by which they might very eaſily extend themſelves, if one particular place had not ſomething in it, unknown to us, which cauſes them to continue where they are. To inſtance one amongſt many, by way of example: the *Corniſh Chough*, or *Coracias* of *Aldrovand*, is ſaid by Mr. *Willoughby*, in his Ornithology, to breed on the clefts and rocks of Cornwal, and on the coaſts of Wales, and all the weſtern coaſts of England. Yet I cannot learn that there are any of them on the ſouthern coaſts of England to the eaſtward of Devonſhire, nor on any part of the eaſtern coaſts; though theſe are in parallel latitudes to the weſtern coaſts where theſe birds abound, and the coaſts in many places have clefts and rocks ſeemingly as convenient for them to breed in as any on the weſtern coaſts of England. I have alſo obſerved the hen birds of a great number of ſpecies to be of a brown or clay colour, where the cocks of the ſame ſpecies are covered with beautiful feathers of a very great luſtre. It is very obſervable in the *Duck* kind, that the males are moſt of them remarkable for beautiful colours, and the females, almoſt all of them, of browniſh or earthy colours. We may remark the ſame thing in many land birds, as the *Peacock*, who is remarkable for ſhining colours, whereas the hen is of a dirty brown, with little or no luſtre. The ſame difference may be obſerved between the males and females of all the *Pheaſant* kind, and of many other tribes of birds. This difference ſeems to proceed from a providential deſign of nature; ſeeing the hen birds, when they hatch their young, ſit on the earth, and are many of them expoſed to the open ſky, to the view of noxious beaſts and birds of prey, which would preſently diſcover them, were they of glaring colours much differing from the earth on which they ſit; but by being of an earthy colour, and drawing their heads cloſe to their bodies, they appear like rude clods of earth, and deceive the eyes both of man and beaſt, by which means they are preſerved from deſtruction.

CHAP. II.

WORKS of Natural Hiſtory, when truly illuminated, may be conſidered as a book legible to people of all nations and languages, whether learned or illiterate: real repreſentations of animals, &c. properly delineated and coloured, are characters that all nations are taught by nature to underſtand; and, in many reſpects, good figures from nature ſurpaſs the beſt verbal deſcriptions. In the courſe of my works I have generally had the advantage of working from real nature, many of my ſubjects being alive and in high perfection, and others well preſerved in order to be imported to us from foreign parts; and, if my figures fall ſhort of nature, as they certainly muſt, it is not for want of care in me, or proper ſubjects to work from; but becauſe there is an infinite difference between the Great Creator of natural productions, and the preſumptuous weak creature, who dared to eſſay an imitation of the works of the Omnipotent. Sometimes, being for a moment thoughtleſs of the Great Source of nature, I have vainly fancied my faint imitations of her works in ſome degree complete; but, on the leaſt recollection, a ſlow, awful, majeſtic voice ſeemed to reprove me thus: Vain and preſumptuous wretch! doſt thou imagine thy faint endeavours can bear the leaſt compariſon with the works of him that created thee and all things?

Amongſt animals there are, in reſpect to their ſight and time of action, diurnal, nocturnal, and ſuch as act in the morning and evening twilight. Amongſt the firſt may be placed men and monkeys, from the *Homo Sylveſtris* down to the ſmalleſt ſpecies of monkeys properly ſo called. Not long ſince I had a little monkey of St. Jago, who was ſo very nimble, that, when he got looſe in a ſmall room, I could not catch him; but, on ſhutting the light out of the room, I could take him preſently. Birds of the granivorus kind are, I believe, all diurnal: and birds of prey are divided into diurnal and nocturnal; though many of thoſe eſteemed diurnal will prey in the evening and morning twilight, as moſt of the eagle and hawk kind do. Owls cannot bear the day, and do not fly till the twilight advances towards night; but whether or not they fly in dark nights, I cannot tell. I believe many of the water-fowls to be nocturnal; for herns, bitterns, and ſome others, are ſeen on the wing in the morning and evening twilight. Many of the quadrupeds ſee both in the night and in the day, but the cat kind more remarkably; for they not only range and prey in the night, but delight alſo to baſk in the hot ſunſhine at noon-day, though their eyes are not formed to bear ſo ſtrong a light; but nature has given them a power to contract the pupil of the eye in ſuch a manner, that no more light is admitted than what their eyes can bear. The bat is wholly a nocturnal quadruped, never appearing by day. All ſorts of cattle that graze in the fields are diurnal, and, in ſome meaſure, nocturnal; for they move about and feed in the night. Beaſts of prey are, in a ſtricter ſenſe, nocturnal, becauſe the night is their principal time of ſeeking their prey; nevertheleſs, moſt of them occaſionally appear and ravage in the day time.

There is a very great difficulty to trace preciſely the links of nature's chain in its gradation from animal to vegetable beings. When we come below what men generally eſteem animals, and enter upon the polypes and coralline ſpecies, we are greatly at a loſs, as there are various opinions concerning them amongſt the curious of theſe times, ſome making them real animals, and others real vegetables. For my own part, I think many of them may be deemed of a middle nature, partaking of both; for, though they ſeem to adhere by roots, and increaſe as vegetables do, by ſhooting forth young polypes from their ſides, and by becoming perfect polypes from the divided parts of others, which are marks of vegetation, they have, at the ſame time, a power to move their parts, and put forth tentacula or arms, with which they catch ſmall inſects whereon they feed, thereby ſhewing they partake of an animal nature. See Mr. Baker on Polypes, and Mr. Ellis on Corallines. Various are the means in nature by which animals are produced; ſome are males and females of the ſame ſpecies; others are hermaphrodites, each one of the ſpecies partaking of both ſexes, as do moſt ſorts of ſnails, &c. Moſt animals on the land generate by contact; but many of the female fiſhes caſt their eggs (called hard roe) in the water, when the male fiſh is near at hand, who ſhedding his ſeed (called ſoft roe) in the water at the ſame time, it mixes with, and gives life to the eggs, without his touching the female. The whole race of birds increaſes from eggs, which they ſit upon to hatch their young. Quadrupeds that are hairy, all bring forth their young alive; as do alſo ſome few that are ſcaly, as the Armadilla kind: but all animals of the Lizard kind, whether of the land or water, or frequenting both, from the Crocodile down to the ſmalleſt ſpecies, lay eggs, which are hatched by the warmth of the ſun. Some fiſhes bring forth their young alive. A remarkable, and, I believe, ſingular way of generation is obſerved in a large ſpecies of the toad brought from Surinam, whoſe back is full of ſmall cavities, in each of which is found a young toad; ſome of the young brood are breaking forth from their cells, others remain ſtill covered with a thin membrane, and ſome of the cells are found empty, at the ſame time. A good ſpecimen of this toad is preſerved in ſpirits at the Britiſh Muſeum. Vegetables are propagated in various manners: the moſt general is by ſeed; but many by cuttings, ſlips, ſhoots from their roots, &c. What I have obſerved to be moſt ſingular is the tuft of leaves or crown of the pine-apple (Ananas), which, when taken from the fruit, and ſet in a pot of earth, takes root, and becomes a new plant: and the early red lily, which bears roots at every joint up the ſtem that ſupports the flower; theſe roots fall off in the autumn, ſtrike their fibres into the ground, and will, in two or three years, produce flowers. We know little of the generation of minerals, they being hid from our ſight.

Inſects not only prey on one another, but they can even catch birds, and devour them. The great ſpiders of America frequently take Humming Birds in their webs. See Marianus's Hiſtory of Inſects. Flies will alſo deſtroy ſheep and other cattle, by laying their eggs on their ſkins amongſt their wool or hair; which eggs produce worms that will eat through their ſkins, and deſtroy the beaſts, unleſs prevented by the owner's care. The generation of inſects is more various and ſupriſing than that of the other parts of the animal creation: many of them appear and act as different animals, in ſhapes very unlike each other, though they are identically the ſame.

In claſſing of animals there is a very great difficulty. In birds we place the ſeveral ſpecies of the ſame genus together; but, when we have done this to the beſt of our abilities, we are doubtful which genus to prefer to the firſt place, and ſo on to the laſt; for, I believe, no two men, who had not conſulted others, would place them in the ſame order. The like may be ſaid of quadrupeds, fiſhes, and the whole tribe of leſſer animals. It appears, at fiſt view, as if quadrupeds gradually declined into birds: for the bat ſeems to have extended wings, and actually flies; and the gerbo hops like a bird on its hinder legs, never uſing its fore paws or hands in its progreſſive motion, which is an action that belongs to birds: yet, on a ſtrict examination, neither of theſe animals have any relation at all to birds; for they bring forth their young alive, they nouriſh them with their milk, they are covered with hair, they have teeth, and, in ſhort, four limbs or legs, as other quadrupeds have. The bat, indeed, has the fingers of its arms or fore legs greatly lengthened, and connected by fine membranes, to enable it to fly in the air: the gerbo has alſo hands or fore feet, with fingers, in which it holds its food, though it doth not put them to the ground in its progreſſion.

On the other hand, quadrupeds ſeem to unite with fiſhes; for it is doubtful whether we ſhould claſs the ſeveral ſpecies of the ſeal kind with the four-footed beaſts or fiſhes: they are hairy, and have teeth like four-footed beaſts; but, whether to call their extremities feet or fins, with propriety, I do not know. Amongſt birds, the penguins from the Straits of Magellan, and thoſe from the Cape of Good Hope, (ſee my Hiſtory of Birds, pl. 49 and 94) are accounted half fowl and half fiſh by our ſeamen; but, on a ſtrict inquiry, I think, they muſt hold the place of perfect birds, partaking of no other animal nature: for, though their little wings appear, at firſt ſight, to be ſcaly fins, yet, on applying magnifying glaſſes, they plainly diſcover themſelves to be covered with minute feathers, having tubes or quills, ſhafts and webs, as larger feathers have.

I believe it would be a vain attempt, in the moſt knowing naturaliſt, to think of ranging all the productions of nature, animals, vegetables, and minerals, in ſuch a true and natural order, that each particular body ſhould ſtand preciſely in its proper place, between two other bodies that juſtly and naturally ſhould go before and follow after it. There ariſe inſurmountable difficulties, when we go about to conſider what relation any one body or thing bears to another: ſometimes, indeed, the chain of connexion may be carried on, in ſeeming regular links, for a little way; but we ſhall find it impoſſible for human judgment to continue it to any great length.

Mr. Briſſon, in his Ornithology, publiſhed at Paris, A. D. 1760. has given a General Hiſtory of Birds, both as a compiler and an original author; and I think it, in general, a very good and uſeful work: but I find in it, what will happen to every compiler that hath not long and carefully ſtudied the ſubjects he treats of, viz. frequent repetitions of the ſame identical ſpecies of birds under different names, as they are deſcribed by different authors, which by him are deſcribed in ſeparate articles, as birds ſpecifically diſtinct from each other; by which means, I apprehend, he hath greatly multiplied the ſpecies of birds. His Ornithology is now finiſhed, which makes ſix thick volumes in quarto, with a great number of copper-plates, containing the figures of a great number of new birds, altogether unknown to me. They are engraved with great labour and neatneſs; tho' moſt of them have a ſtiff air, as if drawn from dried or ſtuffed birds: but in a work of this nature it is excuſeable; for it cannot be ſuppoſed the hired operators had opportunity to ſee and ſtudy the ſhapes and attitudes of the ſubjects whilſt living. Mr. Briſſon has conſulted all the authors, whether natural hiſtorians or voyagers, who have wrote any thing on birds, and has collected the names given them by all the authors, in all languages: and I believe his Synonyma are fuller and more extenſive than they are in any former author, but theſe very long Synonyma are very liable to miſtakes.

ESSAY III.

OF BIRDS OF PASSAGE, &c.

CHAP. I.

IT would be very proper for all travellers into foreign parts, to take notice of what birds and beaſts they find, and at what ſeaſons of the year they find them, and at what times they diſappear, and when they appear again; that ſo we may in time give a tolerable account of the places to which birds and beaſts of paſſage go that are found with us, and in other countries, only at certain ſeaſons of the year. Many may think, perhaps, that there are no beaſts of paſſage, but I have been informed by a perſon of reputation, who now reſides in one of the Engliſh forts in Hudſon's-Bay, that the deer in that country paſs northward in the beginning of winter, and return to the ſouth at the approach of ſummer; and that they paſs in certain beaten tracts well known to the Indians, as well as the Engliſh reſiding there, who lie in wait for them, and kill great numbers for their ſkins. This makes the thing more ſtrange, and contrary to our common way of reaſoning, than it ſeems to be in the erroneous account; but if we conſider, that theſe deer in the winter are cloathed with an exceeding thick covering, which falls off, and leaves them very thinly cloathed in the ſummer, it will reconcile this account a little to our reaſon. Arthur Dobbs, Eſq; has remarked their paſſage northward in winter, and ſouthward in ſummer, in his Account and Natural Hiſtory of Hudſon's-Bay. They are ſaid, by the natives, to paſs very far north in the ſummer, and to return, in the winter, far enough ſouthward to come to a temperate climate. I have in my ſearches after birds diſcovered ſome few, that are found in England at certain ſeaſons, to be found alſo in Bengal; and ſome found in Europe, though not in England, are found alſo in Bengal: whether they continue there all the year, or are only birds of paſſage, as they are with us, I cannot tell; but it would be worth the obſervation of any curious Engliſhman reſiding in that country; therefore I ſhall ſet down their names, viz.

The Greater Redſtart,	Merula Saxatilis, Aldrov.
The Witwal,	Icterus, Plinii,
The Wheat-Ear,	Oenanthe or Vitiflora,
The Small-Green-Wren,	Regulus non criſtatus,
The Houſe-Swallow,	Hirundo domeſtica,
The Bee Eater,	Merops,
The Wry-neck,	Iynx or Torquilla.

Of this number the Wheat-Ear, the Green-Wren, the Houſe-Swallow and Wry-neck, are found in England in ſummer, and all of them in the ſouthern parts of Europe, where I believe they are birds of paſſage alſo. All theſe I have met with in parcels of birds ſent from Bengal; and if any perſon of good obſervation in India could diſcover that theſe birds are abſent there while preſent with us, and preſent there whilſt abſent here, it would anſwer the queſtion, whither and in what manner do theſe birds paſs?

It is indeed my opinion, that all thoſe birds, which are ſeen with us only ſome part of the year, paſs into other countries when they are out of our ſight. We are certain ſome of them muſt, becauſe they do not breed while they continue with us; theſe are the Wood-cock, Snipes, Field-fare, Redwing, and ſome others. Theſe, I believe, go into northern countries to breed. The ſummer birds of paſſage alſo come from more ſouthern countries northward to us, and breed here. Seeing then birds retire from more northern parts to winter with us, why ſhould not tender birds who viſit us in ſummer, and breed here, retire and ſhelter themſelves in ſouthern countries, where they are ſecure from cold, which they cannot bear, and find ſuch food as is natural to them. But many would make ſleepers of them, and ſay they retire to holes under ground, and in hollow trees, &c. and that they are ſo fat that they cannot fly far at the times they diſappear, ; which fatneſs I take rather for a providential proviſion to enable them to take a flight of many days without being quite exhauſted and ſpent. A farther reaſon to me, that our ſummer birds who diſappear are not ſleepers, is, that no ſuch ſleeping birds have at any time been found, and all the reports of theſe things are ſo uncertain, that no ſober man can at all depend on them. Did they really creep into holes as is reported, it would be certainly known, and not remain, as it does, a very doubtful matter; for why ſhould they not be daily found ſleeping, as are Dormice, by woodmen and country people, ſince many of the ſuppoſed ſleepers are found awake in much greater numbers. I believe, indeed, that the inſtinct of theſe birds is not ſo abſolutely certain, as to prevent them from being ſometimes ſurpriſed by a very cold wet autumn. In ſuch a caſe I believe ſome flocks of Swallows have loſt their paſſage, and have been conſtrained through weakneſs to ſhelter themſelves in holes where they have periſhed.

If travellers would be at a little expence of thought and labour, I believe we might come to ſome tolerable knowledge in relation to the paſſage of birds, which is now very obſcure to us. In order to forward ſuch knowledge, I ſhall here point out ſuch authors as have ſaid any thing on that ſubject, and join to them ſuch little obſervations as I have made. There was publiſhed ſome years ago, by Mr. Charles Morton, without date, and ſince republiſhed in the Harleian Miſcellany, Vol. II. pag. 558. an ingenious, though I think chimerical, account of the Paſſage of Birds, which ſuppoſes them to go to the moon, or ſome inviſible aerial iſland fixed above our atmoſphere, with ſome other ſuch like conjectures. Dr. Shaw in his Travels, or Obſervations on Barbary, &c. has given us ſome light as to the paſſage of the Stork, which I ſhall here borrow from him, pag, 428. " The Ibis, that " was once known to every family [in Egypt] is " now become exceeding rare, though the want " of it is ſufficiently ſupplied by the Stork; " for, beſides a great number of theſe birds, that " might undoubtedly eſcape my notice, I ſaw in " the middle of April [1722] our ſhip lying " then at anchor under Mount Carmel, three " flights of them, each of which took up more " than three hours in paſſing by us, extending " themſelves at the ſame time more than half a " mile in breadth; they were then leaving Egypt

" (where the canals and ponds, that are annually " left by the Nile, were become dry) and directed themſelves towards N. E. It is obſerved of " the Storks, that for about the ſpace of a fortnight before they paſs from one country to another, they conſtantly reſort together, from all " the circumjacent parts, to a certain plain, and " there forming themſelves once every day into " a *Dou-wanne* (according to the phraſe of the " people) and are ſaid to determine the exact " time of their departure, and the places of their " future abodes. Thoſe that frequent the marſhes " of Barbary appear about three weeks ſooner " than the flights above-mentioned were obſerved to do, though they likewiſe are ſuppoſed to " come from Egypt, whither alſo they return a " little after the Autumnal Equinox, the Nile " being then retired within its banks, and the " country in a proper diſpoſition to ſupply them " with nouriſhment. No leſs extraordinary are " thoſe flights of Pigeons, that have been obſerved in New-England, and other parts of " America." I think what is ſaid by Dr. Shaw in the above quotation is ſufficient to convince any one, that the Stork is a conſtant inhabitant of this world, and that it only paſſes from one part of its ſuperficies to another at certain ſeaſons, the better to accommodate itſelf with a temperate climate, and proper food. Thoſe that leave Egypt in April, and direct their courſe north-eaſt, are, I ſuppoſe, what appear in Germany, and the Low Countries, all the ſummer. A north-eaſt direction from Egypt carries them along the coaſt of Judea, for its whole length; from whence it is likely they go directly north, acroſs Natolia, and paſs by the eaſt end of the Black Sea, by which means they have land in view through the courſe of their whole journey; when they have paſſed by the Black Sea, the firm lands of Europe and Aſia to the north are open before them, ſo that they may take their courſe to the places of their deſtined habitations. I ſuppoſe they do not breed in Egypt, ſince Dr. Shaw hath not mentioned it; but I imagine that all birds of paſſage go northward to breed, and retire ſouthward toward winter, that is, of ſuch birds as inhabit on this ſide the Equinoctial Line; for, I ſuppoſe, that what birds of paſſage there are, that continue always to the ſouth of the Equinoctial, go toward the ſouthern Pole in the ſummer of that part of the world, and retire toward the Equinoctial Line at the approach of their winter. Yet, I believe, the Stork breeds in ſome parts of the world as far ſouth as Egypt, though perhaps the climate may be cooler, becauſe of its high ſituation. For le Bruyn, in his Travels into Muſcovy, Perſia, &c. tells us, that on the tops of the tall pillars in the ruins of Perſepolis he obſerved Storks neſts, on ſome of them one neſt, on others two. Thoſe Storks that paſs to the northward of the weſt from Egypt to the northern coaſts of Barbary, I ſuppoſe breed there, becauſe they continue there all the ſummer according to Dr. Shaw's account.

I ſuppoſe thoſe Storks that viſit the northern parts of Barbary never paſs over the Mediterranean ſea into Spain, or France; becauſe we have no account of their being found there at any time of the year. Theſe countries may be, for ſome cauſe unknown to us, not adapted to their nature. I am not of the vulgar opinion, that they avoid theſe lands, becauſe their governments are monarchical. The Stork is, I believe, the largeſt bird of paſſage we have in Europe; it is known by its flight, and taken more notice of than ſmaller birds of paſſage. If any knowing perſons, who travel, would make particular obſervations on the ſmaller kind of birds, when they paſs to and from particular countries, I believe we ſhould ſoon gain a tolerable knowledge in the paſſage of the ſmaller birds, and aſcertain the places of many of their habitations at all times of the year. To illuſtrate the hiſtory of the Pelican, I ſhall add a quotation from Dr. Shaw's Supplement to his Travels or Obſervations, &c. page 89. which is as follows:

" The *Onocrotalus*, another noted bird of the
" Nile, is likewiſe called the Pelican; the re-
" markable large pouch or bag, that is ſuſpend-
" ed from the bill of this bird, ſerves not only
" as a repoſitory for its food, but as a net like-
" wiſe wherewithal to catch it; and it may be
" further obſerved, that in feeding its young
" ones (whether this bag be loaded with water or
" fiſh) the *Onocrotalus* ſqueezes the contents of it
" into their mouths, by ſtrongly compreſſing it
" with the bill upon its breaſt; an action which
" might well give occaſion to the received tradi-

" tion, and report, that the Pelican, in feeding " her young, pierced her own breaſt, and nou" riſhed them with her blood."

The reverend Mr. Durand, F. R. S. has obliged me with an obſervation on the paſſage of birds, which he himſelf made in Spain, and is as follows: " I can aver, that being in Spain in " 1707, in the kingdom of Valencia, upon the " ſea coaſt, a little way from Caſtillon de la Plane, " I ſaw, in October, great flocks of birds com" ing from Africa, in a direct line from the ſouth; " ſome of them, being ſhot, were found to be " Thruſhes [Grives], but ſo dry and lean, that " they had little ſubſtance or taſte; the people " of the country told me, that they came every " year at the ſame ſeaſon in flocks, but that the " greateſt part of them go on farther; they grow " fat in Switzerland by feeding on juniper ber" ries, and are delicious all the winter long."

The above paragraph of Mr. Durand ſeems to contradict my opinion relating to the paſſage of birds; but though theſe Thruſhes come from the ſouth to the coaſt of Valencia, I do not think it a certain argument, that they come from Africa; for to me it ſeems contrary to reaſon to imagine, that after birds have lived in the ſummer heats of Africa, they ſhould go to Spain, and on farther northward, to ſuſtain the cold of a winter, in a country ſo far north of their ſummer habitation; for it is generally believed, that birds paſs, in order to attain habitations of near the ſame temperature with thoſe countries they come from; now, ſeeing the ſea-coaſt of Valencia lies north and ſouth, an eaſterly direction only can bring theſe birds from the ſea. Now, I ſuppoſe, that when birds depart from their ſummer habitations, they gather into great flocks, and have a certain courſe to direct themſelves in; and that in their greateſt rout they may fly ſo high as to be out of ſight; and, when they have arrived at the place of their winter's habitation, they may ſeparate into leſſer flocks, in order to cover ſome large country; theſe leſſer flocks may tend to every point of the compaſs; after this they may ſeparate, and diſperſe themſelves ſingly, in order the better to accommodate themſelves with food, and ſcatter themſelves all over a country: ſo that I ſuppoſe, the birds Mr. Durand mentions might come from the moſt northern parts of Europe, and a great part of them in their paſſage turn a little to the weſt, through France, and into Spain; and when arrived about Granada, in the ſouth of Spain, might ſeparate into parties, the better to occupy the whole country; ſo that part of them might return a little way northward, along the coaſts of Murcia and Valencia, and afterwards ſpread themſelves into the inlands. I think this opinion no way contradicts what Mr. Durand has ſaid: what is mentioned of theſe birds feeding and growing fat in Switzerland doth not belong to this queſtion, for it cannot be known, that they are part of the flocks ſeen paſſing on the coaſt of Valencia.

There was publiſhed, anno 1745. in 12mo, A new general Hiſtory of Birds, with wooden cuts, by J. Oſborn in Pater-noſter-Row, London; the author anonymous: in the article of the Swallow there are collected ſeveral obſervations on, and accounts of, the paſſage of birds, from good authors *.

Dr. Shaw, in his fore-mentioned work, page 253. ſays, "the Woodcock makes its firſt "appearance in October, and continueth till "March following: the Africans call it [*Ham-*"*marel Hadiel*] the Aſs of the Partridges." Since no account tells us where the Woodcocks go in ſummer, I am of opinion that they retire to the northern and unfrequented parts of the world to breed. The above account ſhews, that they ſpread themſelves far ſouthward in the winter.

I have diſcovered, that there are many birds common both to the old world and America: I ſaw lately brought from Hudſon's-Bay a bird, under the name of a Snow bird, which, they ſay, is one of the firſt that appears in the ſpring, while the ſnow is yet on the ground. On ſtrictly examining this bird, I found it to be the great Pied-Mountain Finch, or Brambling, deſcribed in Willoughby's Ornithology, page 255. Beſides this, I have received from North-America the Red-Legg'd Horſeman, or Totano, deſcribed in Willoughby, page 299. the Bald Coot, deſcribed page 319. and the Croſs-Bill, or Loxia, deſcribed page 248. of the ſame author. Theſe are all birds found in Europe, as well as in America; two of them, viz. the Croſs Bill, and the Pied-Mountain Finch, are ſmall land birds. I have alſo received from America the little bird we call the Golden-Crowned Wren. There are many of the water fowls, that frequent the northern parts of the world, found both in Europe and America; the White Partridge, or *Lagopus Avis*, is found in North-America as well as in Europe. Mr. Cateſby, in his Hiſtory of Carolina, &c. has particularized many birds that he obſerved to be inhabitants both of America and Europe. I do not wonder to find that birds, who breed on the ſea ſhores, and make long flights over the ſea in the northern parts, ſhould be, indifferently, inhabitants both of the new and old worlds, becauſe we know that toward the North Pole the continents of Europe and America are very near to one another; and may, for aught we know, join near the Pole. We muſt ſuppoſe that theſe birds have paſſed from America to Europe, or from Europe to America; or that there were created, at firſt, birds of the ſelf-ſame ſpecies in both theſe parts of the world; which, according to my way of reaſoning, cannot be ſuppoſed. Moſt of the world agree, that each ſpecies ſprung from an original ſingle pair. But it ſeems more eaſy to conceive how the northern water fowl ſhould inhabit all the northern parts of the world, than to imagine how ſmall land birds, and ſome greater fowls of ſhort flight, ſuch as the White Partridge, ſhould be able, from one and the ſame original, to propagate itſelf in Europe and America. I cannot think theſe ſmall birds, &c. can ſpread themſelves from any part of Europe weſtward, becauſe we know that there are wide ſeas between Europe and America, which reach pretty near the North Pole, in countries where few or no land birds are found, even in the ſummer: therefore I imagine, that they have found a way eaſtward from Tartary. We cannot indeed ſay there is a commodious paſſage that way, ſince Japan in Aſia, and California in America, are the neareſt lands to each other that we certainly know of, which, however, are at a very great diſtance: yet we know not but there may be iſlands, or extended continent, between theſe lands, ſomething to the northward, that may join, or nearly join, Aſia and America. I think our finding ſmall land birds of the ſame individual ſpecies in both parts of the world, is a probable reaſon for this opinion. I cannot help thinking, that America was alſo peopled with the human ſpecies from Aſia eaſtward. What has confirmed me in this opinion is a deſcription of the *Samoeds* [man-eaters] to the north-eaſt of Archangel in Ruſſia: ſee Le

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* See theſe Obſervations, page 96.

Bruyn's Travels into Muſcovy, Perſia, &c. Vol. I. page 6. Le Bruyn was bred a limner, and has been at the pains to figure a head of one of the *Samoeds* in large, on a folio page, which gives every one that has ſeen any of the North-American people a perfect idea of them.

CHAP. II.

MY good friend, the late Mr. Mark Cateſby, I remember, ſometime before his death, preſented a paper to the Royal Society, relating to the paſſage of birds, which was read at one of their meetings. This paper I have not by me, but well remember the general opinion advanced in it was, that he imagined ſuch birds as were inhabitants with us only part of the year, departed from hence to inhabit ſouthern countries on the other ſide of the Equinoctial Line, juſt of the ſame degree of latitude with thoſe they departed from on the northern ſide: ſuch a conjecture, at firſt ſight, ſeems to be probable enough; becauſe, in general, it is ſuppoſed, that during our winter ſeaſon, the temperature of the weather, in the ſouthern latitudes, is nearly the ſame as it is with us in our ſummer; and then of conſequence a bird of paſſage, that paſſes from ſixty degrees of northern, to ſixty degrees of ſouthern latitude, will meet not only with the ſame altitude of the ſun, in both latitudes, provided the paſſage is made in September or March, but with nearly the ſame degree of heat. But if we conſider, that there are many birds of paſſage found far to the northward, in ſeventy degrees of latitude (where, I believe, all the fowls are birds of paſſage, it not being a climate fit for their ſubſiſtance in winter) they muſt have a long way to paſs, according to Mr. Cateſby's notion; for ſeventy degrees to the Equinoctial Line, and ſeventy degrees again to the ſouth of it, are an hundred and forty degrees, which, at our loweſt computation of a degree of latitude, make eight thouſand four hundred miles, which is a prodigious flight for a bird to peform in a ſhort time. Birds that are conſtant inhabitants between the Tropics, it is very likely, may make tranſits acroſs the Equinoctial, to accommodate themſelves with proper food at different ſeaſons, or to avoid the inconveniency of the exceſſive rains in one place, by ſeeking the more dry and pleaſant ſeaſons in another; but to imagine that birds who inhabit the high latitudes, either of the northern or ſouthern hemiſpheres, ſhould change their habitations,

tions, from an extreme northern, to an extreme ſouthern latitude, or *vice verſa*, is contrary to all reaſon, and the nature of things; for birds inhabiting frigid, or temperate climates, would find themſelves almoſt out of their proper element, while paſſing through a tract of more than forty-five degrees of the Torrid Zone, before they could arrive at their natural and cooler climates on the oppoſite ſide of the Torrid Zone; nor is there any reaſon at all for birds to paſs from the northern to the ſouthern hemiſphere, in order to arrive at a place of a proper and wiſhed-for temperature; for when a bird leaves its northern ſituation at the approach of winter, and advances ſouthward, he arrives at ſome place of an equal degree of heat with that of the northern ſummer from whence he departed, without coming near the Equinoctial Line; ſo that I ſee no reaſon at all to ſuppoſe they paſs from the north, acroſs the Line, to ſouthern habitations; but I think it moſt reaſonable that they ſhould ſtop when they have found a reſting place in a climate of equal temperature with that from which they departed; for to ſuppoſe they go a long voyage acroſs the Line, into far diſtant ſouthern countries, is only carrying them a long journey to ſeek what they might find near at hand. We know that the Stork, who inhabits ſome of the more northern parts of Europe in the ſummer, retires in the winter no farther than Egypt, about the mouths of the Nile, which is on this ſide of the Line: but according to Mr. Cateſby's opinion, ſhe muſt retire into ſome ſouthern *Terra Incognita*; for we know of no land, on the old-world-ſide of the globe, of ſo high a ſouthern latitude as Holland lies north, which is one of the ſummer habitations of the Stork. There remains ſomething yet more difficult to be cleared up in relation to the paſſage of ſome birds; I mean ſeveral of the ſhort-winged water-fowl, that, during the ſummer months, inhabit the northern iſlands of Europe; ſuch as the Daniſh iſlands of Farro, and Iceland, and many others farther north, even on the coaſt of Greenland. Amongſt theſe, the moſt remarkable for its ſhort wings, is my Northern Penguin, figured in plate 147 of my large work, which is a bird never ſuppoſed to be capable of any flight at all, not even ſo much as to free itſelf from the water. There are ſeveral others with ſhort wings, and of ſuch ſhort flight, that they cannot fly to the places where they breed, on high rocks, without making ſeveral ſtages, by flying from one ridge to another, and ſo mounting at laſt to their neſts and rooſting places. Amongſt theſe are the Razor-Bill, the Gillemot, and the Coulterneb, which ſee deſcribed by our countryman Willoughby, in his Ornithology, page 123, 4, 5. All theſe birds, with ſome others of the ſame genus, diſappear in the winter; and it is not conceivable that they ſhould take long flights in order to change their ſituation, eſpecially the Penguin, who certainly cannot fly at all.

It remains now to conſider what ſhould become of theſe birds, during their abſence from the ſight of the inhabitants of thoſe iſlands: there muſt be ſome providential means to preſerve them unſeen, in that part of the world where they appear only in the ſummer months; for in the ſpring they are ſaid to appear all at once, in as great numbers as if they had never been abſent. I think the moſt rational conjecture, for the manner of their hiding themſelves, and being preſerved during the long and cold winters of thoſe climates, is, that there are ſub-marine caverns in the rocky ſhores of thoſe iſlands; the mouths of which caverns, though they be under water, may lead to hollows, ſo riſing within ſide as to afford a convenient dry harbour, fit to preſerve theſe birds in a kind of torpid ſtate during the winter. The ſea lying before the mouths of ſuch caverns, and they having a vaſt depth of mountain over them, their inward capacity muſt be defended from any rigid cold, which may be a means to preſerve theſe fowls; and late in the Spring (about May) the time of the appearance of theſe birds, the outward warmth of the air, and the returning ſtrong ſun beams on the water, near the mouth of the cavern, may, by a ſmall degree of heat and light, re-animate, as it were, theſe animals, and bring them from their ſtate of forgetfulneſs, by degrees, to the uſe of life and motion, till at laſt they are emboldened to launch forth for another ſummer, ſeek their prey in the ocean, and propagate their ſpecies on the neighbouring rocks.

It is ſuppoſed by many, that there are lands to the northward of the great mother of ſeas, the Pacific Ocean, and that they connect the weſtern parts of North America with the eaſtern limits of Tartary. Theſe lands cannot conveniently breed any birds but ſuch as inhabit them all the year; becauſe there are no lands to the ſouthward of them for birds of paſſage to paſs unto: ſo that, if there be any, they muſt make long journeys to the eaſt or weſt, before they can find land more ſouth, and in a warmer latitude than what they muſt leave behind them. I think it reaſonable to believe, that many birds, which are conſtant inhabitants of warm countries, paſs from one warm country to another, on account of the great rains which fall very heavily at certain ſeaſons of the year, and continue without intermiſſion for ſeveral months together; while countries very near, perhaps ſeparated only by a ridge of mountains, enjoy a dry ſerene ſeaſon. Numberleſs ſuch inſtances are given by voyagers: ſo that birds may eaſily take the advantage of it; for it is not eaſy to conceive how fine-feathered land-birds can ſubſiſt during a three-months heavy rain.

Mr. Clineus ſays, that the Sand-Martins, or Shore-Birds, continue in their holes all the winter: but Mr. Colinſon, of London, F. R. S. has examined into that matter, this preſent month (October 1757) after the Sand-Martins had wholly diſappeared, by deſiring a clergyman, his particular friend, in Surry, who lived near a convenient ſpot for the experiment, to open a place where a great number of Sand-Martins had been obſerved to build their neſts in the foregoing ſummer. The earth was accordingly opened near the edge of a pit where many of their holes were made; and, on digging down to them, no birds were found; though the neſts were found perfect, in ſome of which were found corrupted white eggs, and in others ſome flies, of the Bee kind, had taken ſhelter. To be the more certain, the paſſages into the neſts, which were about a foot and a half in length, little more or leſs, were quite free of any lodgments of birds; and, upon ſearch, were found to be open and empty. Many of the holes were examined, and traced to their utmoſt extent, and no birds were found in them.

I humbly beg pardon for troubling the reader with conjectures ſo new and uncommon; but, as I cannot ſolve the diſappearance of theſe birds any other way, I hope the hint may put ſome perſon, of a more acute penetration, upon ſearching out the true place of their winter habitation, or at leaſt produce ſome more probable conjecture. It is the opinion of ſeveral very curious and learned gentlemen, that ſeveral of our Engliſh ſmall birds, which diſappear in the winter, do not paſs the ſeas into foreign countries, but that they hide themſelves in holes and caverns, where they lie torpid all the winter. The reaſon they give for it is, that they become ſo fat in the autumn, at the time of their diſappearing, that they can make but very ſhort flights: and this fatneſs is ſuppoſed to ſupply and nouriſh them during the winter. But this opinion will not, I believe, hold good in all ſmall birds; for I take it to be manifeſt beyond diſpute, that the Swallow-kind leave this iſland in the autumn.

Having, in page 81, mentioned A new general Hiſtory of Birds, wherein are collected ſeveral opinions on the paſſage of birds, I ſhall here, and in the following chapter, give an abſtract of them, as that book is but little known.

"The migration of birds is no leſs wonderful than any other particular which has been mentioned. This is common to various kinds, of them, as the Swallow, Quail, Stork, Crane, Fieldfare, Woodcock, Martin, Nightingale, &c. Mr. Derham has produced what is obſerved by the prophet, as a remarkable inſtance of inſtinct, "That the Stork in the heavens knoweth her appointed times, and the Turtle, and the Crane, and the Swallow, obſerve the time of their coming."

"This, ſays Mr. Chambers, is a curious article in natural hiſtory, and furniſhes a notable inſtance of a powerful inſtinct impreſſed by the Creator. It is ſtrange that theſe unthinking creatures ſhould know the moſt proper times for their paſſage, when to come, and when to go. —No doubt but the temperature of the air, as to heat and cold, and their natural propenſity to breed their young, are the great incentives to theſe creatures to change their habitation; but yet, that they ſhould comply with theſe incentives, and annually ſhift their habitation at all, is wonderful.

" Again, that they ſhould know what way to ſteer their courſe, and whither to go, is ſomewhat amazing to conſider. What inſtinct is it that moves a poor fooliſh bird to venture over vaſt tracts of land, and eſpecially croſs large ſeas, in queſt of freſh and farther conveniences? If it be ſaid, that by their high aſcents into the air, they can ſee acroſs the ſeas, yet what ſhould teach or perſuade them that that land is more proper for the purpoſe of breeding and feeding than this? that Britain, for inſtance, ſhould afford them better accommodation than Egypt, than the Canaries, than Spain, or any other of the intermediate countries?

"It is farther obſervable, that birds in their migration diſcover wonderful order and polity: they fly in troops, and ſteer their courſe through huge unknown regions without the compaſs. —Add to this, that the birds of paſſage are all peculiarly accommodated by the ſtructure of their parts for long flights.

"Whither theſe birds go, or where they have their abode while abſent from us, is an inquiry I can find little ſatisfaction in."

CHAP. III.

THE learned and ingenious differ ſo widely in their accounts with relation to the places where theſe birds go, it may afford the curious reader no diſagreeable entertainment to give him their various ſentiments on the ſubject.

Dr. Derham remarks, " Swifts and Swallows have remarkably ſhort legs, eſpecially the former, and their toes graſp any thing very ſtrongly: all which is uſeful to them in building their neſts, and other ſuch occaſions as neceſſitate them to hang frequently by their heels. But there is far greater uſe of this ſtructure of their legs and feet, if the reports be true of their hanging by the heels in great cluſters (after the manner of Bees) in mines and grottos, and on the rocks by the ſea, all the winter. Of which latter, I remember the learned Dr. Fry told this ſtory at the Univerſity, and confirmed it to me ſince, viz. That an ancient fiſherman, accounted an honeſt man, being near ſome rocks on the coaſt of Cornwal, ſaw, at a very low ebb, a black liſt of ſomething adhering to the rock, which when he came to examine, he found it was a great number of Swallows; and, if I miſremember not, of Swifts alſo, hanging by the feet to one another, as Bees do; which were covered commonly by the ſea-waters, but revived in his warm hand, and by the fire. All this the fiſherman himſelf aſſured the doctor of.

"The ſame ingenious author farther remarks, that it is Mr. Willoughby's opinion, Swallows fly into Egypt, Ethiopia, &c. but Olaus Magnus, Etmuller, and ſome modern travellers, he ſays, put this matter quite out of doubt.

"He then gives the relation of Dr. Colas, as follows:

"We had, at a meeting of the Royal Society Feb. 12, 1712-13, a farther confirmation of Swallows retiring under water in winter from Dr. Colas, a perſon very curious in theſe matters;

ters; who, ſpeaking of their way of fiſhing in the northern parts, by breaking holes, and drawing their nets under the ice, ſaith, that he ſaw ſixteen Swallows ſo drawn out of the Lake of Samrodt, and about thirty out of the king's great pond in Roſineilen; and that at Schlebitten, near an houſe of the Earl of Dobna, he ſaw two Swallows juſt come out of the waters, that could ſcarce ſtand, being very wet and weak, with their wings hanging on the ground; and that he hath obſerved the Swallows to be often weak for ſome days after their appearance.

" The ingenious Dr. Owen, in his Hiſtory of Serpents, ſpeaking of Woodcocks and Fieldfares viſiting us in the winter, and then returning northwards, ſays, " But as to Cuckows and Swallows, it is generally allowed that they ſleep in winter, having, as it is ſaid, been found in hollow trees and caverns. Nor is this at all unlikely; though, on the other hand, I can ſee no abſurdity in ſuppoſing that theſe ſhould go upon a ſummer, as the others do upon a winter pilgrimage; that theſe purſue a leſſer heat, as well as the others fly from a greater cold.

“ De Ovalle obſerves, that the Swallows come into Chili in the ſummer, and go away againſt the winter into warmer climates, as they do with us in Europe.

“ The following account may be found in the Tour through Great Britain; where, ſpeaking of the towns of Southwould, Ipſwich, and ſome others in the eaſtern parts of the kingdom, the author has the following remarks: “ At this town in particular, and ſo at all the towns on this coaſt, from Orford-Neſs to Yarmouth, is the ordinary place where our ſummer friends, the Swallows, firſt land when they come to viſit us; and here they may be ſaid to begin their flight, when they go back into warmer climates. I was ſome years before at this place, about the beginning of October; and lodging in a houſe that looked into the church-yard, I obſerved in the evening an unuſual multitude of Swallows ſitting on the leads of the church, and covering the tops of ſeveral houſes round about: this led me to inquire of a grave gentleman, whom I ſaw near me, what the meaning was of ſuch a prodigious multitude of Swallows ſitting there; O, Sir, ſays he, turning towards the ſea, you may ſee the reaſon, the wind is off ſea; for this is the ſeaſon of the year when the Swallows, their food failing here, begin to leave us, and return to the country, wherever it be, from whence I ſuppoſe they came; and this being the neareſt land to the oppoſite coaſt, and the wind contrary, they are waiting for a gale, and may be ſaid to be wind bound.

"This was more evident to me, when in the morning I found the wind had come about to the north-weſt in the night, and there was not one Swallow to be ſeen.

"Certain it is, that the Swallows neither come hither merely for warm weather, nor retire merely from cold; they, like the ſhoals of fiſh in the ſea, purſue their prey; they are voracious creatures, and feed flying; for their food is the inſects, of which, in our ſummer evenings, in damp and moiſt places, the air is full. They come hither in the ſummer, becauſe our air is fuller of fogs and damps than in other countries; and for that reaſon breeds great quantities of inſects. If the air be hot and dry, the gnats die of themſelves, and even the Swallows will be found famiſhed for want, and fall down dead out of the air, their food being taken from them. In like manner, when cold weather comes in, the inſects all die; and then of neceſſity the Swallows quit us, and follow their food wherever they go. This they do in the manner I have mentioned above; for ſometimes they are ſeen to go off in vaſt flights like a cloud; and ſometimes again, when the winds grow fair, they go away a few and a few, as they come, not ſtaying at all upon the coaſt.

"This paſſing and repaſſing of the Swallows is obſerved no-where ſo much, that I have heard of, as on this eaſtern coaſt; namely, from above Harwich to the eaſt point of Norfolk, called Winterton-Neſs, north; which is all right againſt Holland. We know nothing of them any farther north, the paſſage of the ſea being, as I ſuppoſe, too broad from Flamborough Head, and the ſhore of Holderneſs in Yorkſhire, &c."

To the foregoing accounts, we ſhall give an abſtract from Mr. Penant's valuable work intitled Britiſh Zoology, under the article Swallow.

"There are three opinions among naturaliſts concerning the manner the Swallow tribes diſpoſe of themſelves after their diſappearance from the countries in which they make their ſummer reſidence. Herodotus mentions one ſpecies that reſides in Egypt the whole year: Proſper Alpinus aſſerts the ſame; and Mr. Loten, late governor of Ceylon, aſſured us, that thoſe of Java never remove. Theſe excepted, every other known kind obſerve a periodical migration, or retreat. The Swallows of the cold Norway, and of North America, of the diſtant Kamtſchatka, of the temperate parts of Europe, of Aleppo, and of the hot Jamaica, all agree in this one point.

"In cold countries, a defect of inſect food, on the approach of winter, is a ſufficient reaſon for theſe birds to quit them: but ſince the ſame cauſe probably does not ſubſiſt in the warm climates, recourſe ſhould be had to ſome other reaſon for their vaniſhing.

"Of the three opinions, the firſt has the utmoſt appearance of probability; which is, that they remove nearer the ſun, where they can find a continuance of their natural diet, and a temperature of air ſuiting their conſtitutions. That this is the caſe with ſome ſpecies of European Swallows, has been proved beyond contradiction. We often obſerve them collected in flocks innumerable, on churches, on rocks, and on trees, previous to their departure hence; and Mr. Collinſon proves their return here in perhaps equal numbers, by two curious relations of undoubted credit: the one communicated to him by Mr. Wright, maſter of a ſhip; the other by the late Sir Charles Wager, who both deſcribed (to the ſame purpoſe) what happened to each in their voyages. "Returning home, ſays Sir Charles, "in the ſpring of the year, as I came into ſounding in our channel, a great flock of Swallows "came and ſettled on all my rigging; every "rope was covered; they hung on one another

" like a ſwarm of Bees; the decks and carving " were filled with them. They ſeemed almoſt " famiſhed and ſpent, and were only feathers " and bones; but being recruited with a night's " reſt, took their flight in the morning." This vaſt fatigue proves that their journey muſt have been very great, conſidering the amazing ſwiftneſs of theſe birds: in all probability they had croſſed the Atlantic ocean, and were returning from the ſhores of Senegal, or other parts of Africa; ſo that this account, from that moſt able and honeſt ſeaman, confirms the later information of M. Adanſon.

" The ſecond notion has great antiquity on its ſide. Ariſtotle and Pliny give as their belief, that Swallows do not remove very far from their ſummer habitation, but winter in the hollows of rocks, and during that time loſe their feathers. The former part of their opinion has been adopted by ſeveral ingenious men; and of late ſeveral proofs having been brought, at leaſt, of ſome ſpecies having been diſcovered in a torpid ſtate. Mr. Collinſon favoured us with the evidence of three gentlemen, eye-witneſſes to numbers of

Sand Martins being drawn out of a cliff on the Rhine, in the month of March 1762. And the honourable Mr. Daines Barrington, this year, communicated to us the following fact, on the authority of the late Lord Belhaven, that numbers of Swallows have been found in old dry walls, and in ſand-hills near his lordſhip's ſeat in Eaſt Lothian; not once only, but from year to year; and that when they were expoſed to the warmth of a fire, they revived. We have alſo heard of the ſame annual diſcoveries near Morpeth in Northumberland, but cannot ſpeak of them with the ſame aſſurance as the two former: neither in the two laſt inſtances are we certain of the particular ſpecies.

"The above are circumſtances we cannot but aſſent to, though ſeemingly contradictory to the common courſe of nature in regard to other birds. We muſt, therefore, divide our belief relating to theſe two ſo different opinions, and conclude, that one part of the Swallow tribe migrate, and that others have their winter quarters near home. If it ſhould be demanded, why Swallows alone are found in a torpid ſtate, and not the other many ſpecies of ſoft billed birds, which likewiſe diſappear about the ſame time? The following reaſon may be aſſigned:

"No birds are ſo much on the wing as Swallows; none fly with ſuch ſwiftneſs and rapidity; none are obliged to ſuch ſudden and various evolutions in their flight; none are at ſuch pains to take their prey; and we may add, none exert their voice more inceſſantly; all theſe occaſion a vaſt expence of ſtrength, and of ſpirits, and may give ſuch a texture to the blood, that other animals cannot experience; and ſo diſpoſe, or, we may ſay, neceſſitate, this tribe of birds, or part of them, at leaſt, to a repoſe more laſting than that of any others.

"The third notion is, even at firſt ſight, too amazing and unnatural to merit mention, if it was not that ſome of the learned have been credulous enough to deliver, for fact, what has the ſtrongeſt appearance of impoſſibility; we mean the relation of Swallows paſſing the winter immerſed under ice, at the bottom of lakes, or lodged beneath the water of the ſea at the foot of rocks. The firſt who broached this opinion was Olaus Magnus, archbiſhop of Upſal, who very gravely informs us, that theſe birds are often found in cluſtered maſſes at the bottom of the northern lakes, mouth to mouth, wing to wing, foot to foot; and that they creep down the reeds in autumn, to their ſubaqueous retreats. That when old fiſhermen diſcover ſuch a maſs, they throw it into the water again; but when young inexperienced ones take it, they will, by thawing the birds at a fire, bring them indeed to the uſe of their wings, which will continue but a very ſhort time, owing to premature and forced revival.

"That the good archbiſhop did not want credulity, in other inſtances, appears from this, that after having ſtocked the bottoms of the lakes with birds, he ſtores the clouds with mice, which ſometimes fall in plentiful ſhowers on Norway, and the neighbouring countries.

"Some of our own countrymen have given credit to the ſubmerſion of Swallows; and Klein patroniſes the doctrine ſtrongly, giving the following hiſtory of their manner of retiring, which he received from ſome countrymen and others. They aſſerted, that ſometimes the Swallows aſſembled in numbers on a reed, till it broke and ſunk with them to the bottom; and their immerſion was preluded by a dirge of a quarter of an hour in length: that others would unite in laying hold of a ſtraw with their bills, and ſo plunge down in ſociety: others again would form a large maſs, by clinging together with their feet, and ſo commit themſelves to the deep.

"Such are the relations given by thoſe that are fond of this opinion; and, though delivered without exaggeration, muſt provoke a ſmile. They aſſign not the ſmalleſt reaſon to account for theſe birds being able to endure ſo long a ſubmerſion without being ſuffocated, or without decaying, in an element ſo unnatural to ſo delicate a bird; when we know that the Otter *, the Cormorant, and

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* Though entirely ſatisfied in our own mind of the impoſſibility of theſe relations; yet, deſirous of ſtrengthening our opinion with ſome better authority, we applied to that able anatomiſt,

and the Grebes, ſoon periſh, if caught under ice, or entangled in nets: and it is well known, that thoſe animals will continue much longer under water than any others to whom nature hath denied that particular ſtructure of heart, neceſſary for a long reſidence beneath that element."

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anatomiſt, Mr. John Hunter; who was ſo obliging to inform us, that he had diſſected many Swallows, but found nothing in them different from other birds as to the organs of reſpiration. That all thoſe animals which he had diſſected of the claſs that ſleep during winter, ſuch as lizards, frogs, &c. had a very different conformation as to thoſe organs: that all theſe animals, he believes, do breathe in their torpid ſtate; and, as far as his experience reaches, he knows they do: and that therefore he eſteems it a very wild opinion that terreſtrial animals can remain any long time under water without drowning.

I ſhall here inſert a receipt of the manner of making pictures of birds with their natural feathers.

A

RECEIPT

FOR MAKING

PICTURES OF BIRDS,

WITH THEIR

NATURAL FEATHERS.

FIRST, take a thin board, or pannel of deal, or wainſcot well ſeaſoned, that it may not ſhrink, then ſmoothly paſte on white paper, and let it dry; and if the wood caſts its colour through, you may paſte on a ſecond paper, and it will be whiter: let the ſecond paper dry, then get ready any bird that you would repreſent, and draw it as exact as may be on your paper'd pannel, of its natural ſize, (middle-ſized birds are beſt for this work) then paint what ground-work, or tree, or other thing, you deſign to ſet your bird on, together with the bill and legs of the bird in water-colours, leaving the bird to be covered with its own natural feathers. You muſt firſt prepare the part to be feathered, by laying on pretty thick gum Arabic, diſſolved in water, with a large hair pencil; then lay the pannel flat, and let it dry hard, and when dry cover it with your gum-water a ſecond time, and let it dry, and then a third, in caſe you do not find it lie with a good body on the paper; the thickneſs of a ſhilling, when dried hard, is ſufficient. When your piece is thus prepared, take the feathers off from your bird, as you uſe them, beginning always at the tail, and points of the wing, and working upwards to the head; obſerving to cover that part of your draught with the feather, that you take from the ſame part in your bird, letting them fall one over another in their natural order. You muſt prepare your feathers by cutting off the downy part that is about their bottoms; and the larger feathers muſt have the inſides of their ſhafts ſhaved off with a knife, to make them lie flat; the quills of the wings muſt have their inner webs clipped off, that in laying them the gum may hold them by their ſhafts. When you begin to lay them, take a pair of ſteel pliers to hold the feathers in; and have ſome gum-water, not too thin, and a large pencil ready to moiſten the gummed ground-work by little and little as you work it; then lay your feathers on the moiſtened parts, which muſt not be wateriſh, but ſomething tacky or clammy to hold the feathers. You ſhould prepare a parcel of ſmall leaden weights, in the form of ſugar-loaves, which you may caſt in ſand, by firſt making holes in its ſurface with a pointed ſtick: theſe weights will be neceſſary to ſet on the feathers you have newly laid on to hold them to the gum, till they are dry and fixed; but you muſt be cautious leſt the gum come through the feathers; for it not only ſmears them, but dries to the bottoms of the weights, and you will be apt to pull off the feathers with the weights, which will diſorder your work. When you have wholly covered your bird with feathers, you muſt, with a little thick gum, ſtick on a piece of paper cut round, of the bigneſs, and in the place of the eye, which you muſt colour like the eye of the bird. When the whole is dry, dreſs the feathers round the out-line that may chance to ſtare a little, and rectify what may be mended in any other part; then lay a ſheet of clean paper on it, and on that a heavy book, or ſome ſuch thing, to preſs it: after which it may be preſerved in a frame covered with a glaſs.

I ſhall add to this receipt another, that may ſerve to decorate the former; which is a way to take the figures of Butterflies on thin gum'd paper, which may be cut out and ſtuck into other pictures by way of embelliſhment.

A
RECEIPT
For taking the FIGURES of
BUTTERFLIES
ON
THIN GUMMED PAPER.

TAKE Butterflies, or field Moths, either thoſe catched abroad, or ſuch as are taken in Caterpillars, and nurſed in the houſe till they be Flies, clip off their wings very cloſe to their bodies, and lay them on clean paper, in the form of a Butterfly when flying, then have ready prepared gum Arabic, that hath been ſome time diſſolved in water, and is pretty thick; if you put a drop of Ox gall into a ſpoonful of this, it will be better for the uſe;

temper them well with your finger, and ſpread a little of it on a piece of thin white paper, big enough to take both ſides of your Fly; when it begins to be clammy under your finger the paper is in proper order to take the feathers from the wings of the Fly; then lay the gummed ſide on the wings, and it will take them up; then double your paper ſo as to have all the wings between the paper; then lay it on a table, preſſing it cloſe with your fingers; and you may rub it gently with ſome ſmooth hard thing; then open the paper, and take out the wings, which will come forth tranſparent. The down of the upper and under ſide of the wings, ſticking to the gummed paper, form a juſt likeneſs of both ſides of the wings in their natural ſhapes and colours.

The nicety of taking off Flies depends on a juſt degree of moiſture of the gummed paper; for if it be too wet, all will be blotted and confuſed; and if too dry, your paper will ſtick ſo faſt together, that it will be torn in ſeparation. When you have opened your gummed papers, and they are dry, you muſt draw the bodies from the natural ones, and paint them in water-colours. You muſt take a paper that will bear ink very well for this uſe; for a ſinking paper will ſeparate with the wet, and ſpoil all.

ESSAY IV.

CHARACTERS OF EMINENT MEN; WITH A CATALOGUE OF SIR HANS SLOANE's MUSEUM, AND OTHER NATURAL CURIOSITIES.

CHAP. I.

DURING the time of the publication of my Hiſtory of Birds, I had the great honour, happineſs, and pleaſure of being patronized by four gentlemen, who were, perhaps, the greateſt promoters of learning, ſcience, and arts, of any in the preſent age.—The firſt of theſe gentlemen was the late Moſt Noble Duke of Richmond; noble in his lineage and deſcent from the royal houſe of theſe kingdoms, but ſtill more noble and great from the innate magnificence, generoſity, and goodneſs of his ſoul. Though, by his high offices, his time was taken up by the important affairs of the public, yet his doors were always open to men of learning, ſcience, and ingenuity.

The ſecond was the good Sir Hans Sloane, Bart. who employed me, for a great number of years, in drawing miniature figures of animals, &c. after nature, in water-colours, to encreaſe his very great collection of fine drawings by other hands; which drawings are now all fixed in the Britiſh Muſeum, for the help and information of thoſe in future generations, that may be curious or ſtudious in natural hiſtory. Sir Hans, in the decline of his life, left London, and retired to his manor-houſe at Chelſea, where he reſided about fourteen years before he died. After his retirement to Chelſea, he requeſted it as a favour to him, (though I embraced his requeſt as an honour done to myſelf) that I would viſit him every week, in order to divert him, for an hour or two, with the common news of the town, and with any thing particular that ſhould happen amongſt his acquaintance of the Royal

Society, and other ingenious gentlemen, many of whom I was weekly converſant with; and I ſeldom miſſed drinking coffee with him on a Saturday, during the whole time of his retirement at Chelſea. He was ſo infirm as to be wholly confined to his houſe, except ſometimes, though rarely, taking a little air in his garden in a wheeled chair: and this confinement made him very deſirous to ſee any of his old acquaintance to amuſe him. During this latter part of his life, he was frequently petitioned for charity by ſome decayed branches of families of eminent men, late of his acquaintance, who were famous for their learned works, &c. which petitions he always received, and conſidered with attention; and, provided they were not found fraudulent, they were always anſwered by his charitable donations. He has often deſired that I would inquire into the merits of ſuch petitioners; and, if found ſatisfactory, he commiſſioned me to convey his bounty to the diſtreſſed. —The laſt time I ſaw him, I was greatly ſurpriſed and concerned to find ſo good a man in the agonies of death: this was on the tenth day of January 1753, at four o'clock in the afternoon:

noon: he died on the eleventh, at four in the morning. I continued with him later than any one of his relations, but was obliged to retire, his laſt agonies being beyond what I could bear; though, under his pain and weakneſs of body, he ſeemed to retain a great firmneſs of mind, and reſignation to the will of God.

The third of my patrons was the great Richard Mead, M. D. He was certainly magnanimous beyond the common meaſure, and deſerved the title of Great in as extenſive a ſenſe as any man in his ſtation could do. He, as well as Sir Hans Sloane, died in the higheſt ſtations of phyſic they could arrive at, viz. Phyſicians in Ordinary to the King. Dr. Mead, indeed, never was at the head of the College of Phyſicians of London, but it was becauſe he always abſolutely declined it; for he hath been elected into that honourable ſtation, but never could be perſuaded to accept of it. His perſonal ſervice, his ample fortune, his houſe, and every thing in his power, always contributed, in the moſt extenſive manner, to the promotion of learning, ſcience, arts, mechanics, and, in ſhort, every thing that tended to the public benefit and honour of his country, or was of uſe to particular members of the community he lived in. In ſhort, his generoſity was ſo diffuſive, that he may be juſtly deemed a benefactor to the whole community; whilſt, inſtead of hoarding up that great wealth his practice gained, to raiſe a vaſt eſtate, as he might eaſily have done, his public ſpirit was unconfined, and he was contented to leave behind him a moderate fortune only. The worthy Dr. Aſkew, from a laudable veneration for the memory and public character of ſo great a patron of learning, &c. has cauſed a fine marble buſt of him to be made by one of the moſt eminent ſculptors of the preſent age, which is placed in the College of Phyſicians, London. And, on this occaſion, I cannot help informing ſucceeding generations, that they may ſee the real features of Dr. Mead in this ſaid buſt; for I, who was as well acquainted with Dr. Mead's face as any one living, do pronounce this buſt of him to be ſo like, that, as often as I ſee it, my mind is filled with the ſtrongeſt idea of the original.

Martin Folkes, Eſq; the laſt of my deceaſed principal patrons, was a friend and intimate acquaintance of the other three. He had made the grand tour of Europe, not in the younger part of life, but after his marriage. He travelled with part of his family and ſervants, at a proper age to make juſt obſervations, and gather all the commendable parts of the learning, cuſtoms, and manners of the countries through which he paſſed, in order to refine and poliſh thoſe of his own. He travelled not in haſte, as is the general cuſtom; but proceeded ſlowly, and ſpent what time was neceſſary to inform himſelf of all that was worth notice: and, indeed, he ſeemed to have attained to univerſal knowledge; for, in the many opportunities I have had of being in his company, almoſt every part of ſcience has happened to be the ſubject of diſcourſe, all of which he handled as an adept in each. He was a man of great politeneſs in his manners, free from all pedantry and pride, and, in every reſpect, the real unaffected fine gentleman.

The loſs of four patrons, ſo truly noble, ſo good, ſo great, and every way ſo highly accompliſhed, in the ſmall ſpace of three or four years, was an event that greatly humbled me. I imagined, that, after ſo great a loſs to arts and ſciences in general, and to myſelf in particular, all endeavours to excel in any branch of knowledge would be fruitleſs, and of little avail to its author, for want of ſhining patterns to inſpire the riſing generation; and I thought of diſcontinuing any farther progreſs in natural hiſtory: but I find, that the national ſpirit for the promotion of learning and arts, in the eſtabliſhment of that immenſe fund of ſcience, the Britiſh Muſeum, has, in ſome meaſure, revived the paſſion for learning and uſeful knowledge; and I hope theſe ſeeds, ſown by public authority, cheriſhed and protected by a Prince diſtinguiſhed for virtue and learning, will take root, ſpring up, and yield a plentiful harveſt.

The Britiſh Muſeum reminds me of a brief catalogue of the natural and artificial ſubjects contained in it, which Sir Hans Sloane ſhewed me about a year before he died, and permitted me to take a copy of; and, as I believe, though it is ſo very general, it may, for want of a more perfect one, be acceptable to the reader, I ſhall give it as follows:

An account of the names and numbers of the ſeveral ſpecies of things contained in the Muſeum of Sir Hans Sloane, Bart. and which, ſince his death, are placed for the uſe of the public in the Britiſh Muſeum.

The library, including books of drawings, manuſcripts, and prints, amounting to about	vol. 50000
Medals and coins, ancient and modern	23000
Cameos and intaglios, about	700
Seals, &c.	268
Veſſels, &c. of agate, jaſper, &c.	542
Antiquities	1125
Precious ſtones, agates, jaſpers, &c.	2256
Metals, minerals, ores, &c.	2725
Cryſtals, ſpars, &c.	1864
Foſſils, flints, ſtones, &c.	1275

Earths,

Earths, ſands, ſalts, &c.	1035
Bitumens, ſulphurs, ambers, &c.	399
Talcs, micæ, &c.	388
Corals, ſponges, &c.	1421
Teſtacea, or ſhells, &c.	5843
Echini, echinites, &c.	659
Aſteriæ, trochi, entrochi, &c.	241
Cruſtaceæ, crabs, lobſters, &c.	363
Stellæ marinæ, ſtar-fiſhes, &c.	173
Fiſhes, and their parts	1555
Birds, and their parts, eggs and neſts of different ſpecies	1172
Quadrupeds, &c.	1886
Vipers, ſerpents, &c.	521
Inſects, &c.	5439
Vegetables	12506
Hortus ſiccus, or volumes of dried plants	334
Humana, as calculi, anatomical preparations, &c.	755
Miſcellaneous things, natural, &c.	2098
Mathematical inſtruments	55
Pictures and drawings framed	471

Every ſingle particular of all the above articles are numbered, and entered by name, with ſhort accounts of them, and references to ſeveral authors who have heretofore wrote about them, in thirty-eight volumes in folio, and eight in quarto. Some addition has been made to this valuable collection ſince it was depoſited in Montague-houſe, eſpecially to the foſſils, by a valuable preſent from Guſtavus Brander, Eſq;

CHAP. II.

THE exceſſes of heat and cold have, in ſome inſtances, near the ſame effect: fire bliſters the ſkin; and, in the coldeſt ſeaſons at Hudſon's Bay, and in the northern parts of Europe, the touch of cold iron, &c. is dangerous: for metals, by their greater gravity, are, in proportion, colder than frozen water; and, if touched by the hand, will bliſter and take off the ſkin. A ſort of chemiſtry may be performed by froſt as well as by fire. A friend of mine, who reſided ſome years at our ſettlements at Hudſon's Bay, in North America, told me, that on broaching a barrel of lime-juice, for the uſe of their factory, they found it to be hard frozen, which obliged them to take off the hoops from the barrel, and chop off ſome of the ice for their uſe: this, when melted, they found to be almoſt as inſipid as water; and concluded, that the whole caſk was ſpoiled, and of no uſe; but, on breaking farther into the ice, they found in the centre of it a ſmall quantity ſtill liquid, which was ſo ſharp and acid, that a drop of it could hardly be endured on the tongue: this ſmall quantity was preſerved to ſharpen their liquors, and went almoſt as far as the whole barrel would have done, had it continued unfrozen. Olive oil is ſaid to become ſo hard in that country, that they cut it out of the jars with chiſel and mallet; and it is dangerous to ſtand in the way of its ſplinters, for they cut the eyes like glaſs. The ſame curious perſon alſo gave me ſome account of the large iſlands (as they are called) of floating ice, which frequently appear in that tract of ſea our ſhips make between the north of Scotland and the ſouthermoſt cape of Groenland, in their way to and from Hudſon's Bay. Theſe maſſes of ice, he ſays, might be taken for land covered with ſnow, did they not find them in places, which they know, from long experience, to be open ſeas. Some of theſe iſlands appear high and craggy like rocks, having lower parts or plains; and, when the warm ſeaſons are coming on, the ſun melts the ſnow and ice, and cauſes caſcades to fall from the craggy high parts into the lower, where the water ſettles in hollows, forming

ing itſelf into lakes and rivulets. In their voyages they ſometimes go into theſe iſlands to fetch freſh water, and hunt for game, which they ſhoot in plenty, the pools abounding with many ſorts of ſea-fowl: they alſo find on them ſome quadrupeds of the neighbouring countries, ſuch as the white Bear, an amphibious animal, with ſome others which are natives of thoſe northern parts. Theſe iſlands are found in very deep ſeas, and are many of them ſuppoſed to be ſome hundreds of feet deep in the water; ſince, otherwiſe, their upper parts would not riſe ſo high above the water as they appear to do; for, in floating ice, a ſmall proportion of its thickneſs appears above the water. Theſe great maſſes of ice are certainly broken, or ſome how or other detached from the ſhores or land in the high northern latitudes; otherwiſe, I think, no land animals could be found on them: but how, or in what manner, I cannot preſume to conjecture. Some of them extend in length and breadth many leagues. I believe theſe icey iſlands have often deceived northern voyagers, who have pretended to the diſcovery of iſlands in certain latitudes and longitudes, which never could be ſeen by after voyagers, who diligently ſought for the latitudes, &c. pointed out.

To the above account of Hudſon's Bay, I ſhall make bold to ſubjoin an extract of Mr. Ellis's voyage thither, when, he is ſpeaking of the fartheſt part to which they went in Wagers' Straits, he ſays, "I canot help, however, taking notice, that in aſcending thoſe mountains, we had at once as great, as gloomy, and as awful a proſpect, as perhaps ever aſtoniſhed mortal eyes. While we walked along the beach, the ridged rocks above ſeemed pendent over our heads; in ſome places there were falls of water daſhing from cliff to cliff; from others hung prodigious icicles in rows one behind another, like the pipes of a vaſt organ; but the moſt tremendous part of the ſcene was the ſhattered rocks and craggs which lay at our feet, and appeared plainly to have burſt from the mountain's tops, through the expanſive power of the rigorous froſts, and ſo rolled with inexpreſſible fury down the ſides, till they reached thoſe places where their ruins now lie. I call them ruins, for ſuch they properly were; and if there is ſomething

thing that deeply affects us; when we behold either the waſte of war, or the devaſtations of time, it may be eaſily conceived, that ſomething much more terrible muſt be felt from the ſight of the amazing relicks of the wreck of nature."

An attempt towards diſcovering the cauſe of the great riſing of the ſea, and the uncommon agitation of the leſſer waters at Liſbon, and other parts far diſtant from thence, immediately after the dreadful earthquake, on the firſt of November 1755.

THE cauſes of earthquakes are, I muſt confeſs, altogether unknown to me; but whether the late violent far-ſpreading ſhock proceeded from the atmoſphere or air above us, or from ſubterranean convulſions, makes no difference in regard to my conjecture, which only reſpects the agitation of the waters.

If the ſolid parts of this globe be conſidered, as connected and joined altogether in one maſs, (though ſuperficially divided into main-lands and iſlands) and the waters as a fluid, which may have a motion independent of the ſolid earth: then ſuppoſing the earth ſhould receive ſome exceſſive violent ſtroke, either from without its circumference, or from within its bowels, which might, in any manner, ſtun, ſtop, retard, or check its diurnal motion on its axis, (as I think might probably happen from ſo violent a ſhock as that of the late earthquake) in ſuch a caſe, the earth's being ſtopped in its diurnal rotation, or only checked or retarded for a few minutes, or even ſeconds, muſt neceſſarily occaſion a great agitation in the ſeas and other waters: for as the earth turns from weſt to eaſt, and the waters are moved equally, and in the ſame direction with the ſolid parts, if the ſolid parts are ſuddenly ſtopped or retarded by any unnatural violence, ſuch ſtop cannot be immediately communicated to the watery parts of the globe, but they will move ſtill onwards in their firſt direction, and continue their motion eaſtward, according to the diurnal rotation of the earth, till meeting with lands to oppoſe their motion, they riſe upon the ſhores to ſuch a height, and increaſe by degrees ſo much in weight, that the foremoſt waves, becoming an over ballance for the waters behind (which muſt be lower than they) vibrate backwards and forwards, until the cauſe of ſuch an unnatural motion ceaſes.

This may particularly be ſuppoſed to be the caſe on the coaſts of Portugal, which lie open and expoſed, and, as it were, meet the whole force of the great weſtern ocean, which would ſtill keep its courſe for a ſhort time, though the ſhores of Portugal ſhould be ſtopped or ſlacken in their motion.

Leſſer waters may likewiſe be ſuppoſed to have been affected proportionably, by an inſtantaneous ſtop or decreaſe of motion under them: and the waving of the candles in a tallow-chandler's ſhop in Holland, as mentioned in a letter to the Royal Society, may be accounted for on the ſame principle; nor is it improbable, that every veſſel of water, or other liquor, in our houſes, had ſome little motion at the time of the ſhock; for it is reaſonable to believe, that every thing, both by ſea and land, was more or leſs affected in proportion to its ſituation, and as it was nearer to or more remote from the place agitated with the greateſt violence, which place is not I believe exactly known. I alſo imagine it will readily be allowed, that the motion of the earth, according to the ordinary courſe of nature, might be checked or diminiſhed for a very ſmall ſpace of time, without its being perceived by ſenſe, or diſcovered by any of our time-keepers. I am of opinion, that time will diſcover to us, that this mighty ſhock has extended its influence farther than the generality of people imagine. I think it already appears, that the whole Atlantic Ocean has been violently moved. Many accounts from America we received, which mentioned unnatural and ſudden riſings and fallings of the ſea, without giving us the preciſe time, tho I believe them to have been on the firſt of November. One letter particularly from Barbadoes ſays, on the firſt of November, at about two o'clock in the afternoon, the ſea ebbed and flowed in a ſtrange manner, and brought up fiſh over the wharfs into people's houſes. *See General Evening Poſt of December* 27. 1755. This ſeems to prove, that the ſhock was rather on the eaſtern than on the weſtern ſide of the great Atlantic Ocean. Therefore, ſuppoſing the cauſe to be in Portugal, its progreſſive motion may be traced to the Weſt-Indies, which motion ſeems to have taken up about ſeven hours; for from ten in the morning in Portugal, to two in the afternoon in Barbadoes, make four hours difference; and the hours between the longitudes of the two places, makes in all about ſeven hours; which ſeems but a ſmall ſpace of time to extend a motion over one of the greateſt oceans on the earth, the diſtance of Barbadoes from Liſbon being about equal to fifty degrees of the earth's latitude.

A
BRIEF AND GENERAL IDEA
OF
DRAWING and PAINTING
IN
WATER COLOURS;

Intended for the Amuſement of the Curious, rather than for the Inſtruction of Artiſts.

I ſhall not meddle with perſpective: yet, it may not be improper to hint, that perſons who are unacquainted with it can be no proficients in drawing, as is manifeſt from the works of ſome painters of no ſmall fame, in whoſe works a mathematical eye diſcovers very groſs abſurdities. We have many good authors of our own, as well as tranſlations from other languages, on the ſubject of perſpective; from which any one may eaſily gain a general conception of the art, and by a little labour become a maſter of it.

Perſpective is principally neceſſary in regular buildings, where many ſtraight lines run through the various parts of them, of which all that are parallel muſt meet in one point. In other ſubjects a thorough knowledge of perſpective is not ſo abſolutely neceſſary; yet a due regard for it is always to be had; as in landſcapes, to diminiſh every thing according to its ſuppoſed diſtance from the eye; for, by making the diſtant figures the leaſt, and drawing them in finer or fainter lines than you do thoſe that come forwards in your picture, they naturally ſeem to be more diſtant; and when you come to finiſh ſuch picture, your extreme diſtant objects ſhould appear ſo faint, or ſo ſecure, as not to be diſcovered to be of any preciſe form or colour; for ſo it is in natural objects far diſtant from our ſight. As objects draw nearer they may be made a little more expreſſive; and ſo on, more and more, till you come to the neareſt objects of all in the fore-ground of the picture, which ſhould be finiſhed with great ſtrength, and brighter colouring: for it muſt always be conſidered, that ſuch objects as have really in themſelves a very bright colouring, if they are removed

moved to a little diſtance from the eye, will loſe (by the interpoſition of the air) ſome of their luſtre; and by being farther removed they will loſe more of it, till they appear, as it were, colourleſs: for if ſeveral men, cloathed in ſeveral very different and glaring colours, be placed on a diſtant mountain's edge, juſt within the utmoſt reach of the eye, we may diſcover theſe men as objects diſtinct from each other, but without any other colour than what is cauſed by ſeeing them through a great ſpace of greyiſh air; ſo that very diſtant objects may properly be ſaid to have neither light, ſhadow, nor colour. Any common obſerver may perceive, when he commands an extenſive proſpect, where there are ranges of diſtant hills one behind another, that the moſt diſtant are of a flat, faint, bluiſh colour, without any lighter or darker parts, and conſequently without any diſtinct objects viſible on them; therefore, if you would make a picture appear like nature, your greateſt diſtances muſt be faint. Thoſe hills, that lie a little nearer, may ſhew ſome ſmall diſtinction between wood-lands and the bare ſurface of the ground; on others, ſtill nearer, we may diſtinguiſh churches and villages, till we come nearer ſtill, where particular houſes, men, and cattle, may be perceived, and ſo on, till we ſee diſtinctly every viſible object about us.

A theory of this ſort is abſolutely neceſſary in every painter who would imitate nature in almoſt any reſpect. To run it over again; from a near view to a diſtant place, let your firſt or neareſt objects have pure and bright colours, according as the nature of the ſubjects may require. Theſe ſhould be finiſhed with great lights and ſtrong ſhadows: thoſe at a little diſtance ſhould be ſomething leſs bright in their ground-colours, not ſo high in their lights, or ſo deep in their ſhadows; and as they are farther diſtant, they ſhould diminiſh more in the purity of colour, as well as in light and ſhadow, till they have neither light, ſhadow, colour, or diſtinct form; for all is confuſed, and mixed at very great diſtances. As one goes backwards in a picture, much finiſhing is to be ſpared; the windows of a houſe are not ſuppoſed to be viſible at ſome miles diſtance, though the houſe, in its general form, may be ſeen. As to little ornaments in dreſs, they are always to be let alone, if a figure be at any diſtance, for we know that the buttons on a man's coat, or a lady's trinkets, are inviſible at a little diſtance.

In ſpeaking of colours, I ſhall not perplex the reader, as the common books on the ſubject of drawing, &c. have done; which tell you what to mix together for a ſhip, trees, the earth, a brick houſe, lion, fox, &c. for theſe particulars are trifling and ſuperfluous. The way to colour well is, when we are provided with all neceſſary colours, to conſult the natural colours of the objects we would repreſent; then by caſting the eye over the colours we have ready prepared, it is very likely we may find ſomething that in many caſes will ſerve our turn, pure and unmixed; but if we cannot, let us conſider the colours in a compound ſenſe. We have an object, for example, which is purple; amongſt our colours we do not find that, but by mixing red and blue it is produced. Blue and yellow produce green. Red and yellow make an orange-colour. Red, blue and yellow, make browns and cloth-colours of all kinds, by varying the quantities of each; ſo that red, blue and yellow, by a compound of ſome two of them, produce the fine colours, viz. purple, green, and orange-colour; and the three primary colours, red, blue and yellow, compounded all together, in different proportions, produce all the different degrees of browns and cloth-colours, and a ſhadow for white itſelf: for if you take a round piece of card-paper, and divide it into three parts, by lines from the center to the circumference, and waſh theſe three parts with the three primary colours, ſo that neither of them be too ſtrong for the other, and all them pretty light, then fix a pin in the centre, and turn it about ſwiftly, you will find the colours will be loſt in each other, and the paper will appear white, though not of ſo pure a white as before it was coloured.

Though all colours may be compounded from three of the principal colours, yet as the colour-ſhops produce a long liſt of colours, wherein are variety of reds, blues and yellows, of different ſhades and caſts, as well as browns of many different ſorts, it will be convenient for thoſe who ſet out in painting or colouring, to be furniſhed with all of them, which may ſave ſome trouble in compounding.

I ſhall give here a few hints on the preparing of colours, though this ſubject has been largely handled already.—Common reaſon will teach one to reduce all hard ſubſtances by grinding them well on a ſtone, and after grinding them, to levigate them finely in water, by pouring them ſeveral times out of one veſſel into another, after ſtirring them, and letting the gritty and groſſer parts ſettle: this not only takes out all the gritty and groſs particles, but frees many earthy and mineral colours from corroſive ſalts, which would have a bad effect, by making a work ſpotty, or changing the colours, as well as attracting moiſture, which in time is apt to rot the canvas or paper on which they are laid.

There are ſome few colours which are only gums; theſe are gamboge and ſap-green: they hold themſelves on the paper without any additional gum; but all the mineral, or earthy colours, muſt be mixed with a due proportion of gum-arabick, or ſenega, to bind them together, and make them ſtick to the paper. If there be too little gum, the colours will rub off if you paſs your finger over the paper when dried: if too much, the colours will ſhine, crack when very dry, and ſometimes peel off. What I ſay muſt always be underſtood of water-colours, or painting and colouring in water. Indigo muſt be ground with gum diſſolved in water, and, when well ground, dried in ſmall drops, which will be eaſily reduced again to a liquid, in fair water, fit for uſe. I have diſcovered a ſecret relating to purifying indigo, which may be of uſe: make a ſtrong lye of pot-aſh, then break your rock-indigo pretty ſmall, and put it into the lye, ſo that it be covered: it may ſtand a month or more. When you pour off the lye, cover it with boiling water, ſhifting it every day till the water comes from it pretty clear, and it will be purified from all its filth; for the lye, and many of the waters after it, will come from it of the colour of very ſtrong brown beer, while the blueneſs of the indigo is not extracted; the foul colour is drawn from the rotten leaves that are maſhed with the indigo when it is made up:

—it ſhould be thus prepared before the grinding.

There are two uſeful colours I have not mentioned, white and black, which ſome count no no colours at all. I think they may be termed the two extremes of colouring, ſince the one is the ſtrongeſt light we can lay on, and the other the deepeſt ſhade. Theſe are ſeldom uſed pure, but are mixed with other colours. The white (where colours are laid on in a body) mixed, in different proportions, with any other colour, makes all the variety of ſhades that the two colours ſo mixed are capable of producing. White may be compounded with any ſimple or compound colour, to produce different ſhades thereof. Black is often mixed (a little of it) in the ſhades, where the object is of a beautiful and and primary colour, as red, blue, or yellow; for theſe colours, ſhadowed with fine dark colours of their own ſpecies, would be too glaring, and quite unnatural; ſo that it is neceſſary to allay them with black, or ſome dull colour; for if you obſerve nature itſelf, for example, a fine red or blue garment, it will appear exceeding fine in the firſt and ſecond lights; but if you attentively examine the deep ſhades, the colour is often ſo obſcure that you can call it by no particular name.

There are two ways of painting in water; one by mixing white with your colours, and laying on a thick body; the other is only waſhing your paper or vellum with a thin water tinctured with colour. The firſt method, which may more properly be called painting, is thus performed: when you have a drawing finiſhed in out-lines, you lay in your colours mixed with white, in ſuch a medium, as to be about the middle colour between your higheſt lights and deepeſt ſhadow. You may lay in the whole piece before you begin to ſhadow and heighten, or lay in and finiſh it in parts as you think beſt: if you do it in parts, the diſtances muſt be done firſt; becauſe the out-lines of the parts more forwards, may then be worked over the more diſtant and firſt finiſhed parts. When you have laid your ground, the way is, to ſhadow firſt with the ſame colours you have laid in, only with leſs white in them, till you come to your deepeſt ſhadows, wherein is no white at all; but it is to be remembered, that theſe ſtrong ſhadows are required only in the front objects of the picture, and that the deep ſhadows of the fine colours muſt be allayed with black, or brown, to give them their natural obſcurity. When the dark ſhadows are finiſhed, you may begin to heighten the lights, by adding white to the colours with which you laid in the different parts of your picture; obſerving always, that as objects are little ſhadowed, they muſt be little or nothing heightened when very diſtant; but front-figures may be heightened very much: yet we ſhould avoid uſing pure white in the heightening of any object, unleſs it be of a white colour, or hath a poliſhed ſurface, or be ſome other body that reflects the light very ſtrongly.

When all the particular parts of a picture are finiſhed ſeparately, the whole is to be carefully ſurveyed and conſidered, to ſee that there is harmony throughout: for, if diſtances neareſt to the fore-ground are too faint, they will ſeem to be farther off than their perſpective proportions will allow: or, if your greateſt diſtances are expreſſed too ſtrong and diſtinct, they are brought too near, and contradict the ſenſe and meaning of the piece; ſo that after finiſhing the parts, there generally wants ſome amendment in the whole, to make a proper harmony in a picture.

In deſigning, it is generally neceſſary to contrive a piece ſo, that the objects ſhall be relieved by the ground, or relieve each other; for example, if you have light or bright objects, the ground behind them may be a group of dark-green trees, or ſhrubs, which will bring them forwards, and make them appear to advantage. If you have objects in your foreground, that are in the ſhade, or in themſelves are of dark colours, then it will be convenient to place behind them ſome light objects, ſuch as a clear opening in a landſcape, either the earth, hills, or ſky. It is alſo often neceſſary, the better to free a large object from the ground, to make the ground dark on the light ſide, and light on the dark ſide of ſuch object or figure; but yet the ground muſt be ſo ſtudied as to appear very natural, and conceal the artiſt's contrivance.

In a piece of painting, ſpecial care ſhould be taken that there be no very ſharp, or hard lines (as we call them) or any ſudden lights immediately bordering on dark ſhadows, for they are diſcordant in painting: on the contrary, the outlines of objects ſhould be ſo broken into the grounds behind them, as not to be preciſely traced. Many great painters, to avoid a too ſhocking glare of colours, have broke the colours of their draperies, as well as other objects, into one another, for they are really ſo in nature: for example, expoſe a red and a blue ſattin in a good light near each other, and they ſhall both appear purple in thoſe parts of each of them which directly receive the reflection of the other: the ſame is to be obſerved of other colours, ſo that many painters have harmonized all their colours, by never introducing a direct red, blue, yellow, or hardly any other gay colour, without ſome little mixture or allay.

I ſhall proceed to ſpeak of waſhing, or ſtaining in colours, either of drawings or prints, by way of hint to private perſons, who like to amuſe themſelves in that way, rather than to artiſans.—And firſt, of the common way practiſed by the print-ſhops about the town, in their views of palaces, gardens, figures, and all pictures for common ſale. Theſe are to be conſidered as cheap things, done with much expedition, and with little ſtudy, as to propriety in colouring; for ſuch is the judgment of the bulk of the people, that the more glaring they are in their colouring, and the more diſtant from nature, the more they are prized. Theſe common waſhers generally mix a little white in their ſkies and diſtances in colouring of prints, becauſe it takes off the harſhneſs of an ordinary print, as moſt of them are that are ſold coloured.

A fine print, coloured by a judicious artiſt, may be made almoſt equal in value to an original drawing in colours: but for ſuch no one will pay a price equal to its worth. To make an intire drawing in the thin or waſhing way, it muſt firſt be drawn in out-lines, and then you may preceed to finiſh it with different colours in its different parts, as the nature of the thing requires, beginning to waſh with water thinly tinctured with colour, at firſt, and gradually proceeding to uſe it more ſtrong in your ſhadows, employing no white at all throughout your work, but carefully leaving the white of your paper in the high lights of white objects, and very thinly waſhing the lights in coloured bodies. You are to obſerve, that this method is no more than making a drawing in Indian ink, only inſtead of making it all black, you uſe fine prepared colours in the different parts of your picture.

I have ſpoken already of the management and mixture of colours. Prints may be coloured this way, without white intermixed; all the prints in my Natural Hiſtory being without white, for ſuch water-coloured prints, or drawings, as have white mixed in their colours, are apt to change black. In order to procure colours that will be exceeding fine, and run very ſmooth in this way of waſhing, mix a little gummed colour in a large ſhell, and work it well with your finger; then thin it with water, and let it ſettle a little, and by pouring a little off the top of it into another clean ſhell, you will procure a fine free working colour, which you may make as light as you pleaſe by the addition of water. If a colour doth not ſpread itſelf freely, by reaſon of any greaſineſs on your paper, if you touch your pencil ever ſo little in ox-gall, it will make your colours run free. Always obſerve in theſe firſt and lighteſt colours to uſe a large pencil, in order to fill up the ſpace you have to cover with all convenient expedition; for if you are ſlow, and let your colour dry in parts, and touch again over their edges, your colours will be blotchy and ſtreaky.

Paper proper for drawing on in this way, ought to be neither over nor under-gummed: that which is too much gummed, or ſized in the making, is ſo hard and cloſe it will not take in the colours at all; and what is laid on at firſt, one is apt to waſh off again in the ſecond ſhadowing, and ſo on, which is very inconvenient. An under-gummed paper hath a contrary inconveniency; for the colours are apt to run through it, and ſpread beyond your deſign on the outline. A proper paper may be choſen by touching it with your tongue: an ungummed paper will ſtick very ſtrongly to the tip of the tongue when touched: an over-gummed paper will hardly ſtick at all; by which a proper medium may be found, that only ſticks a little to the tongue. It is of ſmall import, whether your paper be very white, or not; for provided it be of an even clear grain and ſurface, a caſt on the yellow or cream will not hurt the drawing when finiſhed. If a print that you would colour be on a looſe ungummed paper, it may be prepared for colouring by waſhing it over (once or more, as it may require) with a thin paſte made of wheat-flour, boiled in water, and letting it dry on between each waſhing.

I am far from thinking myſelf properly qualified to treat on the arts of deſigning and painting; yet it cannot be amiſs for any perſon to treat of an art, ſo far as it hath fallen within the compaſs of his own experience and obſervation.

SOME
BRIEF INSTRUCTIONS
FOR
ETCHING OR ENGRAVING
ON
COPPER-PLATES,
WITH
AQUA FORTIS.

IN the courſe of my performing the engraving or etching of the copper-plates contained in my Natural Hiſtory, I received not only the inſtructions of my friends, but beſtowed ſome pains to examine ſuch authors as had wrote on the ſubject of etching with *Aqua Fortis*.

I could find little or nothing on that ſubject originally wrote by any author of our own country;

try; and what was tranſlated from thoſe of other countries, was from authors of ancient date, wrote, I believe, before artiſts in that way had arrived at the perfection of knowledge they have now attained; and many of theſe authors ſeem not to have practiſed it themſelves; for I have been led by them through many labyrinths (from which I found it difficult to extricate myſelf) before I attained the ready practice of etching, which I am here willing to communicate, in as ſhort and plain terms as I can, for the benefit of many curious young gentlemen who are my friends and acquaintance.

Firſt of all, it will be proper to ſay ſomething of copper-plates.—Authors on the ſubject of etching, tell us how to ſmooth, ſcour, and poliſh them for uſe; which is, I believe, a thing hardly any gentleman will trouble himſelf about, ſeeing that ſeveral people, in and about London, make it their buſineſs to ſquare and ſmooth plates of all ſizes, for perſons who want them. Examine your plates when you buy them, to ſee if they are perfectly free from ſcratches, dents or holes; and if they are bad, ſee that the maker mend them before you take them of him. When you are provided with a plate, the next thing to be conſidered is, a ground to cover it withal.

General Inſtructions in relation to Grounds or Varniſhes, proper to lay on the Plates before they are etched.

The ingredients generally made uſe of for the ground or varniſh, are, firſt, *Aſphaltum*, called alſo *Pitch of Judea*, or *Jew's Pitch* : it is a pretty hard, black, pitchy, or reſinous ſubſtance, commonly brought to us in large gourd ſhells, containing, more or leſs, about forty pounds, and to be had of the moſt eminent druggiſts in London. The ſecond is Bees-wax, either white or yellow. The third is common Roſin. The fourth is Maſtick, a ſort of fine hard roſin in ſmall grains. I have ſometimes added a little common pitch to ſoften it.

Though it will be proper to vary your ground a little, according to the different times of the year you work in, for that which does very well in froſty weather, may be ſo ſoft as to ſtick to your fingers in ſummer; therefore what is uſed in winter muſt have a greater proportion of the ſofter materials, ſuch as the wax and common pitch; and that which is for ſummer uſe may have more of the harder materials of the receipt, which I ſhall here give at a medium, as near as I can, between the two extremes.

A Receipt *for a* Ground *or* Varniſh.

Aſphaltum	—— ——	1½ Ounce
Bees-wax	—— ——	2 Ounces
Roſin	—— ——	½ Ounce
Maſtick	—— ——	½ Ounce
Common Pitch	——	¼ Ounce.

Put all theſe into a new pipkin well glazed, and place it on a moderate fire, and as the ingredients melt, ſtir and incorporate them very well together with a little ſtick: be careful that they do not take fire, or boil over. When all is well melted and mixed, let it ſtand a little while in the pipkin, till the bubbles have done riſing, and ſome of the groſſer parts are a little ſettled to the bottom; then pour it off into a baſon of water, leaving the dregs in the pipkin. When it is a little cooled in the water, take it out, and roll it into a long form, of the thickneſs of your thumb; and while it is yet warm, cut it into pieces of two inches long, more or leſs.

You may make double the quantity of the receipt, but cannot well make leſs. I have found that my Ground, by long keeping, has grown too hard and dry, which I have rectified by melting it down again, and adding a little common pitch.

To lay the Ground *on your* PLATE.

Take your copper-plate, and clear the ſurface of it well from all tarniſh or dirtineſs; then having ſome charcoal lighted, in an earthen pan, or chafing-diſh, fix a ſmall hand-vice to the edge of your plate, and you may then hold the backſide of it downwards to the charcoal fire, that the poliſhed ſide may lie upwards to receive the Ground or Varniſh. When your plate is of a due heat, have a piece of your Ground tied up in ſome very thin ſilk, or ſarſenet, to keep the dreggy parts from getting through; then paſs it over your plate, in all parts, that the plate may be wholly covered; then take a little wad of cotton, tied up in a thin piece of ſilk, and paſs it all over your plate, to ſpread your varniſh even. When it is ſo ſpread, let the plate gradually cool, and while it is cooling dab it all over with your cotton puff, and it will lay your Ground ſtill ſmoother, and with a finer grain, or rather ſhew no grain at all. When you have ſo ſpread your varniſh on the plate, have ready a very large candle, and hold the varniſhed ſide of the plate over the candle, moving it backwards and forwards, till it be of a good black in every part, but be careful the ſnuff do not touch the plate: after which lay it to cool, and it is fit to work upon.

Care muſt be taken in heating your plate, for if your fire be too fierce, your plate will turn of a bluiſh colour: if you perceive any ſuch change on your plate, it muſt be cleanſed bright, and heated again, for ſuch burnt places will not hold the Ground when the *Aqua fortis* is laid on.

When the plate is varniſhed, and cold, you may try how your Ground bears the needle, by hatching (in a waſte corner) ſome cloſe ſtrokes two contrary ways over each other; and if it is of a moderate temperature, ſo as neither to ſtick to the fingers by its ſoftneſs, or fly from the copper by its brittleneſs, you may venture to beſtow ſome labour on it, and proceed in your work.—The next thing in order, is to trace your deſign on the plate.

To trace the Out-lines *from a* Print *or* Drawing *on your varniſhed Plate.*

A print that is not of any value, may be rubbed on the wrong ſide with red chalk, red oaker, Spaniſh brown, Indian red, or any other fine ſoft colour that will rub dry into the grain of the paper. When you have ſo done, lay it on to your plate, and be careful that it doth not ſlip in the working; then trace over all the out-lines of your print with a ſtick of ivory, having a pretty ſmall ſmooth point; for an actual ſharp point will injure the print, and perhaps raiſe the varniſh behind it. When your principal out-lines are drawn, you may touch over ſome of the leſs principal lines in order to have as much of the print on the plate as you can. When all is drawn, take off the print, and you will find the colour ſticking to your Ground, wherever you have drawn over it with your ſtick. If you have a curious drawing, or print of value to copy, you may rub your colour into another paper, which may be laid on the plate firſt, with the coloured ſide downwards, and your drawing may be laid on that, and it will do pretty well; but you will have a better out-line through a ſingle paper, than through a double one.—When your deſign is traced on the plate, you muſt be furniſhed with tools to etch withal.

NEEDLES *for* ETCHING.

Take half a dozen needles, of different ſizes, which may be ſtuck into ſmall cedar-ſticks for handles; the points may be drove into the ſticks, after which you may break off their heads, and grind new points on a hone or oil-ſtone: theſe may be of various degrees of ſharpneſs,

neſs, in order to make ſtrokes of different breadths. When you are ſo furniſhed, you may begin to work on your copper.

Of ETCHING *on your varniſhed* PLATE.

It will be neceſſary, before you begin, to have a piece of very clean, ſoft, old linen rag, with all the ſeams and ſelvages torn off: this may lie double under the hand you work with, to keep the heat, ſweat, or roughneſs of your hand, or nails, from ſoftening, ſcratching, or otherwiſe injuring the Ground. Then take one of your middle-ſized needles, and trace over the out-lines that you have made on the copper, minding to touch ſtrong enough to cut through your varniſh. When all your lines are traced, you may wipe the plate with a ſoft wet ſponge, to take off the coloured out-line; ſo ſhall you ſee what you have traced with your needle more diſtinctly: then ſet the print or drawing before you, on a ſloping board or deſk, and carefully copy it in its leſſer lines, by your eye, obſerving to touch with a fine pointed needle, and a very light hand, the light parts of the print or drawing

ing you copy; and, with blunter pointed needles, give more ſtrength to your ſtrokes, as the darkneſs of the ſhadows increaſes; and by a little practice, obſervation and care, a piece may be finiſhed this way, without the help of engraving after the common method.

I have found by experience, that ſome labour may be ſaved in etching, by a ſort of artifice, which has an effect beyond any thing that can be performed with the needle; that is, in caſe you have a dark object, on which you would repreſent many ſmall white, or light ſpots, firſt etch ſuch object with cloſe croſs hatches, ſo thick that it would print almoſt black; then take a fine hair pencil, dipped in common turpentine varniſh and a little lamp-black, and touch with the pencil what ſhaped or ſized ſpots you would expreſs on the abovesaid dark ſtrong hatching, and it will dry on, and prevent the *Aqua fortis* from taking effect, or eating in thoſe places; and ſo they will print white. The ſame ſort of varniſh, with a little lamp-black, is a good ſtopper, in places where the varniſh is accidentally rubbed off, or where any ſmall error or miſtake is committed, and when dry may be worked over again to rectify a miſtake. The piece ſhould be thoroughly examined, and all omiſſions rectified, before the *Aqua fortis* is applied to the plate.

A ſoft Wax *for bordering the* Plate *to keep on the* Aqua fortis.

Take white roſin and bees-wax in equal parts, incorporate them together over a fire in a pipkin, and make the mixture into a roll for uſe. If it be found too hard to be worked and kneaded with your hands in winter, it may be brought to a greater or leſs degree of ſoftneſs, by melting it again, with a leſs or greater proportion of olive oil.

When your plate and the wax are ready, take a piece of the wax, wet your hands, and roll the wax out in length like a cord, ſufficient to go round the borders of your plate ; then lay your plate in an horizontal poſition, where it may lie firm ; then fix your wax on its edges very cloſe, that the *Aqua fortis* may not paſs between the wax and plate, then pinch it up to an edge, and ſo make it into a kind of wall of half an inch high; after which pour on your *Aqua fortis*, a proper ſort of which is to be had at moſt of the chemiſts ſhops in London, and is generally too ſtrong to be uſed without a mixture of water. You will know when it is too ſtrong, by its almoſt boiling on the plate where it touches the copper; therefore you are to lower it with water, till you ſee the bubbles riſe very moderately; for too great a ſtrength of *Aqua fortis* will break up your Ground, and ſpoil your plate.

When the *Aqua fortis* has been on the plate a little while (about half an hour) if you perceive by the equal bubblings that it has bit kindly, it may be taken off, and the plate clean waſhed with fair water, and well dried; then you may try the depth of your ſtrokes by rubbing off a little ſpot of the Ground, and, if you find it too faint, put the *Aqua fortis* on again; but if you think it has bit enough for the firſt time, you may ſtop (with the before-mentioned varniſh) all thoſe parts that you would preſerve light and tender: let your varniſh dry a little, then put on your *Aqua fortis* a ſecond time, and let it lie about half an hour. It may be taken off, and put on again, if the caſe requires; and you may ſtop other parts that you would not have very dark; but remember to waſh and dry your plate every time you ſtop with the varniſh. Few of my plates have had the *Aqua fortis* on them leſs than half an hour on the lighter parts, or more than a hour and an half on the darker parts. When the plate is bit in as deep as you would have it, waſh the *Aqua fortis* well off from it; then ſcrew your hand-vice on the edge of it, and hold its wrong ſide a while before, or over a fire, and the wax border will ſlip off; then take a little olive, or any oil, put it on the hot plate, and rub it over with a rag, then wipe the plate clean, and you will ſee your deſign very plain. The plate is then fit to ſend to the rolling-preſs for a proof, after which, any common hand may put in a few ſtrokes with a graver, in caſe there be found any little deficiences.

Thus have I given as much, and no more, on the ſubject of etching, than I have diſcovered from my own practice and experience. There are, I believe, many of my countrymen, who could give far better inſtructions in this art than myſelf; but ſome of them, perhaps, are idle, and others intereſted to keep it ſecret. I know of none that have advanced any thing worth naming, on this ſubject, in our language, but what is tranſlated from ſome other.

ANNECDOTES,

AND

ADDITIONAL ACCOUNTS

OF SOME

Subjects in Natural Hiſtory.

The BEARDED VULTURE.

ON laying this bird before the Royal Society, as a ſubject unknown, my friend, Dr. Parſons, took particular notice of two large groups of feathers that fall on the ſides of the lower part of the back or rump, and fill up the ſpaces or gaps between the back and wings, when the wings are cloſed; and having obſerved the like feathers in Eagles to be raiſed up at the pleaſure of the bird, he examined theſe in the Bearded Vulture, and found them to be no part of the wing, but that they had their bottoms fixed only in the ſkin on the ſides of the back: and thinking it ſtrange that the ſkin, ſimply, ſhould have the power to raiſe, and keep ſupported, a large group of long feathers, he aſked me if he might open that part of the ſkin at the roots of theſe feathers, which I was very willing ſhould be done for the ſatisfaction of the Doctor's curioſity, as well as my own. On opening the ſkin, the Doctor ſoon diſcovered the muſcle deſcribed in his following curious letter, wrote at my requeſt, which he has given me free liberty to publiſh for the information of the curious.

S I R, *Red-Lion-Square, Sept.* 21, 1750.

" It is but doing you the juſtice due to your great care and induſtry, in obliging the world with your excellent *Natural Hiſtory of Birds*, to communicate any thing in my power, which might fulfil your laudable intention of putting what you do in a clear light, for the better underſtanding of the branch you are engaged in.

" I have made honourable mention of you, in my lecture upon the muſcles, which I diſcovered in the Sea-Eagle and other-birds, read on Thurſday the 31ſt of May laſt, before the Royal Society, on account of the happy opportunity you were ſo kind to give me of diſſecting the African Bearded Vulture, which you ſhewed to them at one of their meetings, in order to ſearch for the ſame muſcles, which I found in your company.

“ Whatever relates to their actions, not only in the Eagle and Vulture-kinds, but alſo in every other bird whatſoever, will be found in the above mentioned lecture, in the tranſactions of that time: but as this pair of muſcles, and indeed ſome others mentioned in my lecture, were never obſerved before, it may not be improper to add a little account of them to your Hiſtory of the Vulture, if you think proper; for they are about the ſame ſize, and in the ſame ſituation with thoſe of the Haliætos, which gave occaſion to the lecture; and both birds are nearly related to each other, being of the ſame genus.

“ This muſcle on each ſide is about two inches long, ariſing fleſhy by three digiti from the ſecond, third, and fourth ribs, and ending alſo fleſhy in the ſkin a conſiderable way behind the wings. It is a bundle of fleſhy fibres about as thick as a ſmall finger, and equal in bigneſs all along; it has a very ſtrong action, being entirely fleſhy, and muſt of conſequence contract in every part; and as the place of its inſertion in the ſkin is alſo the place of the inſertion of a large group of feathers, having no ſort of connexion with the great wing, which is moved by its own proper muſcles analogous to thoſe of the humerus in other animals, it muſt have been deſigned for a very particular uſe both in land and water-fowls, for which we muſt refer to the ſaid lecture, where they are fully accounted for. In the mean time you will pleaſe to add the name I have invented for this muſcle, which will in ſome meaſure be expreſſive of its uſe. It is the

Muſculus novus remigatorius,
The new ſteering, or rowing muſcle.

" Now, in water-fowls, as well as in thoſe of land, this may be called the *Remigatorius anterior,*

rior, as moving a group of feathers in the fore-part of birds; but there is another pair which I diſcovered, and call the *muſculi remigatorii poſteriores*, as moving a group of feathers behind, and theſe are deſcribed in the ſame lecture.

"I am, with ſincere wiſhes for your health, and ſucceſs in your undertakings,

"Your friend, and humble ſervant,

"JAMES PARSONS.

Of the PORCUPINE.

Extract of a letter, dated Albany, Aug. 10*th*, 1742.

The Porcupine, in this country, is a beaſt which makes its neſt or den under the roots of great trees, and ſleeps much; it feeds on the bark of juniper and other trees, but chiefly on juniper; in winter it eats ſnow inſtead of drinking, and laps water in ſummer like a cat or dog, but carefully avoids going into it. His hair and quills remain all ſummer without alteration of colour; but as the weather grows warmer in the ſpring, the fur grows thinner, as in all creatures in this country: ſince our conqueſt of America, many have been brought alive to England.

The WHIP-POOR-WILL, or LESSER GOAT-SUCKER.

The following account Mr. Cateſby received with theſe birds from a Gentleman in America:

"They come to Virginia about the middle of April, from which time, to the end of June, they are heard every night, beginning about duſk, and continuing till break of day; but it is chiefly in the upper or weſtern parts that they are ſo frequent: I never heard but one in the maritime parts; but near the mountains in the month of May, within a few minutes after ſunſet, they begin, and make ſo very loud and ſhrill a noiſe all night, that the ecchoes from the mountains increaſe to ſuch a degree, that the firſt time I lodged there I could hardly ſleep: they are ſeldom ſeen in the day-time. The Indians imagine theſe birds are the ſouls of their anceſtors formerly ſlaughtered by the Engliſh, and ſay, that they never appeared in their country before that ſlaughter. Many people here look on them as birds of ill omen. I have been informed they lay two eggs, of a dark green, ſpotted and ſcrawled with black, in the plain beaten paths, without any ſign of a neſt, upon which they ſit very cloſe, and will ſuffer a near approach before they fly off."

The PETERIL.

The Peteril is a native of the Cape of Good Hope, where it is called the *Pantado,* which is a name the Portugueze have given to other birds, of a different nature, where they find them ſpotted or painted, as the name denotes.

Dampier ſays, "between Braſil and the Cape of Good Hope, we paſſed by a dead whale, and ſaw (as I may ſay) millions of ſea-fowls about the carcaſs, (and as far round about it as we could ſee) ſome feeding, and the reſt flying about, or ſitting on the water, waiting to take their turns. We firſt diſcovered the whale by the fowls, for indeed I never ſaw ſo many fowls at once in my life before, their numbers being inconceivably great: they were of divers ſorts, in bigneſs, ſhape and colour. Some were almoſt as big as geeſe, of a grey colour, with white breaſts, and with ſuch bills, wings, and tails. Some were Pintado-birds (our white and black ſpotted Peteril) as big as ducks, and ſpeckled black and white. Some were Shear-waters, ſome Peterils. We ſaw of theſe birds, eſpecially the Pintado-birds, all the ſea over, from about two hundred leagues diſtant from the coaſt of Braſil, to within much the ſame diſtance of New Holland. The Pintado is a ſouthern bird, keeping within the Southern Temperate Zone, for I never ſaw any of them much to the northward of thirty degrees ſouth: the Pintado is as big as a duck, but appears, as it flies, about the ſize of a tame pigeon."

Of the Little Peteril I have ſeen a great many together, in the midſt of the more northern or wideſt part of the German Occan, where they muſt have been more than 100 Engliſh miles from land. It is ſtrange that ſo ſmall a bird ſhould be able to ſubſiſt in ſuch open ſeas, where they cannot reſt but on the water, which is always pretty rough. Thoſe I have ſeen were continually on the wing; they appear not, but in tempeſtuous weather, near ſhips, or land.

The EIDER COCK.

The Eider Cock is brown when he is young, but when he is old he groweth almoſt white, and is called Eider-Blink.

From this fowl is gathered *Eider-down*, which the Eider plucks from his breaſt and layeth in its neſt about its eggs when it hatcheth them; and when the young ones are come out and fled away with their dam, this down is taken up from the neſt, being then full of moſs and ſtraw, of which it is cleanſed, and dried. The down which is plucked off at other times from the Eider is good for nothing, for it is fat, and rotteth.

The SUMMER-DUCK.

Mr. Cateſby has deſcribed this bird in his hiſtory of Carolina, vol. I. page 97.

" They breed, ſays he, in Virginia and Carolina, and make their neſts in holes of tall trees (made by wood-peckers) growing in water, particularly cypreſs-trees. While they are young, and unable to fly, the old ones carry them on their backs from their neſts into the water; and at the approach of danger they fix with their bills on the backs of the old ones, who fly away with them. The female is all over brown." I ſuppoſe by the name, it is a bird of paſſage, and retires ſouthward from Virginia, Carolina, &c. at the approach of winter. I have had the advantage of ſeeing ſeveral of theſe birds brought from Carolina to London alive, as well as the above deſcribed, which were newly killed. The females of theſe I have ſeen were all over brown, having ſomething of a creſt, like the male.

MACCAWS.

To illuſtrate the hiſtory of the Maccaws, I cannot help borrowing from Commodore (now Lord) Anſon's Voyage a beautiful paſſage, which deſcribes a waterfall in the iſland of Quibo. " Near the north-eaſt point of the iſland they diſcovered a natural caſcade, which ſurpaſſed, as they conceived, every thing of this kind, which human art or induſtry hath hitherto produced. It was a river of tranſparent water, about forty yards wide, which ran down a declivity of near one hundred and fifty yards in length. The channel it ran in was very irregular, for it was entirely formed of rock; both its ſides and bottom being made up of large detached blocks, and by theſe the courſe of the water was frequently interrupted, for in ſome places it ran ſloping, with a rapid, but uniform motion, while in other parts it tumbled over the ledges of rocks, with a perpendicular deſcent. All the neighbourhood of this ſtream was a fine wood, and even the huge maſſes of rocks which hung over the water, and which by their various projections formed the inequalities of the channel, were covered with lofty foreſt trees. While the Commodore and thoſe who were with him attentively viewing the place, were remarking the different blendings of the waters, the rocks, and the woods, there came in ſight (as it were ſtill to heighten and animate the proſpect) *a prodigious flight of* MACCAWS, *which hovering over this ſpot, and*

and often wheeling and playing on the wing above it, afforded a moſt brilliant appearance, by the glittering of the ſun on their variegated plumage; ſo that ſome of the ſpectators cannot refrain from a kind of tranſport when they recount the complicated beauties which occurred in this extraordinary water-fall."

MONKIES.

Monſieur de la Condamine, of the Royal Academy of Paris, in a voyage through the inland parts of South-America, down the river of the Amazons, gives the following account of a very extraordinary Monkey:

" The governor of Para preſented me with a Monkey, which was the only one of its kind ever ſeen in the country, the hairs of its body being bright as ſilver, and of the colour of the fineſt fair treſſes, whilſt its tail was of a ſhining cheſnut, inclining to black: it had ſtill another ſingularity yet more remarkable; its ears, ſides of the face, and noſe, were of ſuch a lively red, that one could ſcarce be induced to believe it to be its natural colour. I kept it a year, and it was living when I was writing this, almoſt in ſight of the coaſt of France, but in ſpite of the continual precautions I took to preſerve it from the cold, the ſeverity of the weather killed it."

I once had an opportunity of ſeeing, in the houſe of the late Duke of Richmond, at Whitehall, an old ſhe Monkey, who had been brought to England with young: and ſhe brought forth a ſingle cub, of which ſhe was very tender. It was pleaſant to ſee her hold it in her arms, and ſuckle it. Her actions and manner nearly reſembled a woman's nurſing her child. This ſort of Monkey being pretty frequently brought into moſt of the maritime trading parts of Europe, it has probably been deſcribed by ſome former naturaliſt.

The Bat.

Monſieur de la Condamine, in his voyage down the river of Amazons, ſays the Bats which ſuck the blood of horſes, mules, and even men, when they do not ſecure themſelves from them, are a nuiſance common to hot countries in America; and ſome of them are of a monſtrous bigneſs. At Borja, and in divers other places, they have deſtroyed the great cattle which the miſſionaries had introduced there, and which began to multiply in thoſe parts.

Dampier, in his voyage round the world, ſays, in the iſland of Mindanao there are Bats as big as Kites. Near the laſt mentioned iſland lies the iſland of Bats. Dampier ſays this iſland was the habitation of an incredible number of great Bats, with bodies as big as Ducks, or large fowls, and with vaſt wings; for he ſaw at Mindanao one of this ſort, and judged the wings ſtretched out in length could not be leſs than ſeven or eight feet from tip to tip; for it was much more than any of them could fathom with their arms when extended to the utmoſt.

The reverend Mr. Hughes, in his Natural Hiſtory of Barbadoes, p. 68, deſcribes a Bat different from any I have met with; he calls it the Cave-Bat. He ſays, the Hebrew name is *Atalleeph*, i. e. *a bird of darkneſs*. "This Bat, ſays he, hath its name from the place of its reſidence. It is often as big as a young pigeon; its body is covered with a ſnuff-coloured ſoft hair; its ears are more upright, and larger in proportion than thoſe of a rat; and its whole head, eſpecially its mouth and noſe, ſhorter and thicker. From the extremity of one wing to that of the other extended, meaſures eighteen inches: its feet are guarded with ſix ſharp talons, each turning inwards like fiſh-hooks." I believe his giving it ſix claws on a foot to be an overſight; for I have not obſerved more than five in thoſe Bats I have examined. Mr. Hughes ſays, they have alſo, in Barbadoes, the ſame ſmall Bat we have in England.

Whether the Cave-Bat hath a tail, as the two Engliſh Bats deſcribed by me, p. 201, of my Natural Hiſtory, or not, Mr. Hughes does not inform us. There is, in the Britiſh Muſeum, a Bat from Egypt, of a ſize between this Cave-Bat and my Great Bat from Madagaſcar; which

Egyptian Bat is tailleſs, and much reſembles that of Madagaſcar, but much leſs. As a duck is a web-footed bird, a Bat is juſt in the ſame ſenſe a web-footed beaſt or quadrupede, though they differ in many reſpects: a duck, or other water-fowl, hath the toes webbed together with a ſtrong, tough, though pliable web, of a ſmall dimenſion, yet large enough to work in ſo denſe a medium as water: the Bat hath the legs forwards webbed principally, though theſe webs are always joined to the hinder legs; the webs are exceeding thin, ſoft and pliable, and vaſtly extended in breadth, if compared with the webs on the feet of fowls; the reaſon of which is manifeſt; for the air being a medium vaſtly more rare than that of water, it requires a membrane broader, thinner, and more light and delicate to work and ſupport itſelf therein. It is convenient for water-birds to have their oars in the hinder-parts of their bodies, becauſe the water is under them, and they row themſelves forwards on its ſurface; but it is different in Bats; for they have their webs principally on their forward limbs, in order to row themſelves forwards in the air. A gentleman, an eye-witneſs, has

told

told me, that the great Eaſt-Indian Bats work their wings ſlowly, in the manner herons do with us, and not by a ſwift fluttering motion, as our little Bats do. On weighing what I have read in natural hiſtorians and voyagers on this ſubject, I have reaſon to believe there is a great number of diſtinct ſpecies of Bats, from the ſize of a very ſmall bird, gradually increaſing to (almoſt) the bigneſs of an eagle.

The Ruffed Heath-Cock, or Grous.

This bird is a native of Pennſylvania, where it is called a Pheaſant. M. Bartram ſent with it a very curious account in a letter to M. Colinſon, of whom I obtained leave to take an exact copy; which is as follows:

"He is a fine bird when his gaiety is diſplayed; that is, when he ſpreads his tail, like that of a turkey-cock, and erects a circle of feathers round his neck like a ruff, walking very ſtately with an even pace, and making a noiſe ſomething like a turkey; at which time the hunter muſt fire immediately at him, or he flies away directly for two or three hundred yards, before he ſettles to the ground. There is ſomething very remarkable in what we call their thumping, which they do with their wings, by clapping them againſt their ſides, as the hunters ſay. They ſtand upon an old fallen tree that has lain many years on the ground, where they begin their ſtrokes gradually, at about two ſeconds of time diſtant from one another, and repeat them quicker and quicker, until they make a noiſe like thunder at a diſtance; which continues, from the beginning, about a minute; then ceaſeth for about ſix or eight minutes before it begins again. The ſound is heard near half a mile; by which means they are diſcovered by the hunters, and many of them killed. I have ſhot many of them in this poſition; but never ſaw them thump, they moſtly ſeeing me firſt, and ſo left off. They commonly exerciſe thumping in Spring and Fall, at about nine or ten in the morning, and four or five in the afternoon. Their food is chiefly berries and ſeeds of the country: their fleſh is white, and choice food. I believe they breed but once a year, in the Spring, and hatch twelve or fourteen at a brood, which keep in a company till towards the following Spring. Many have attempted to raiſe the young ones, and to tame them, but to no purpoſe. When hatched under a hen they eſcape into the woods ſoon after they are hatched, where they either find means to ſubſiſt or periſh."

In order further to illuſtrate the hiſtory of this bird, I wrote to Mr. Brooke, of Maryland, in North-America, *May* 1752, now in *London*, to deſire the favour of him to give me what account he could of the bird called a Pheaſant, in the provinces of Pennſylvania, Maryland, &c. and he obliged me with a ſatisfactory anſwer, by letter, from which I have made the following extract, relating to the hiſtory of this ruffed Grous or Pheaſant.

"The Pheaſant breeds in all parts of Maryland, ſome countries on the weſtern ſhore excepted. They lay their eggs in neſts they make in the leaves, either by the ſide of fallen trees, or the roots of ſtanding ones. They lay from twelve to ſixteen eggs. The time of incubation is in the Spring; but how long their eggs are hatching I cannot ſay; but, probably, it is three weeks, the time that a dung-hill hen ſits. I have found their neſts, when a boy, and and have endeavoured to take the old Pheaſant, but never could ſucceed; ſhe would let me almoſt put my hand upon her before ſhe would quit her neſt; then by artifice ſhe would draw me off from her eggs by fluttering juſt before me for a hundred paces or more; ſo that I have been in conſtant hopes of taking her. They leave their neſts as ſoon as hatched, and I believe they live at firſt on ants, ſmall worms, &c. When they are a few days old, they hide themſelves ſo artfully among the leaves, that it is difficult to find them: as they grow up they feed on various berries, fruits and grain of the country; grapes they likewiſe are fond of in the ſeaſon; but the Pheaſant is more particularly fond of the ivy berry. I do not know any other animal that feeds on theſe berries: I know they are poiſon to many. Though the Pheaſant hatches many young ones at a time, and often ſits twice a year, the great number and variety of hawks in Maryland feeding on them prevents their increaſing faſt.—The beating of the Pheaſant, as we term it, is a noiſe chiefly made in the ſpring of the year by the cock-birds; it may be diſtinctly heard a mile in a calm day. They ſwell their breaſts like the pouting pigeon, and beat with their wings, which makes a noiſe not unlike a drum in ſound; but the Pheaſant ſhortens each ſounding note, till they run one into another indiſtinguiſhably like ſtriking two empty bottles together."

In order to perfect, as far as I am able, the hiſtory of this bird, I ſhall give a quotation from Byron Lahontan's voyages to North-America, publiſhed in Engliſh. See vol. firſt, page 67th, where he ſpeaks of a bird found near the lakes of Canada, which I think can be no other than the above deſcribed, though the names given them diſagree.

Lahontan ſays, "I went in company with ſome Canadians on purpoſe to ſee that fowl flap with its wings. I believe this ſight was one of the greateſt curioſities in the world; for their flapping makes a noiſe much like a drum for about the ſpace of a minute, then the noiſe ceaſeth for half a quarter of an hour, after which it begins again. By this means we were directed to the place where the unfortunate More-hen ſat, and found them upon rotten moſſy trees. By flapping one wing againſt another they mean to call their mates, and the humming noiſe that enſues thereupon, may be heard a quarter of a league. This they do only in the months of April, May, September and October; and, which is very remarkable, the More-hen never flaps in this manner but upon one tree. It begins at break of day, and gives over about nine o'clock in the morning, till about an hour before ſunſet, then it flutters again and continues ſo to do till night.

The SPUR-WINGED PLOVER.

Paul Lucas, in his Voyage to the Levant, edit. in 3 vols. 12mo, printed at Rouen, *anno Domini* 1719, gives a very ſtrange account of a bird found in the river Nile, which ſeems to me to be this very ſpecies of bird. Therefore, to amuſe the reader, I ſhall tranſcribe his account of it (ſee vol. iii. page 7.) "This bird is like a lapwing, and near of its bigneſs, which flew about and went into the crocodiles mouths, and throats, which were then extended on the water in the Higher Egypt, and were juſt before our author's boat; and after they had ſtaid a while, the crocodiles ſhut their mouths, and opened them again ſoon after to let them go out. The people told me that theſe birds, of which there was a vaſt number, feed themſelves on what remains between this animal's teeth, by ſucking them; and as they have a kind of ſpur, or very ſharp thorn on the tips of their wings, they prick the crocodile and torment him when he has ſhut his mouth, till he opens it again and lets them out; and thus they ſecure themſelves from the danger they were in. Likely theſe are the birds which Pliny calls *Trochilos*. *Beitar* an Arabian author tells ſuch another ſtory of a bird, but doth not mention its name." As I have received one of theſe birds from the Eaſt Indies, it is very probable it may be a native of the Upper Egypt, which is in or about the ſame latitude.

The BUTCHER-BIRD.

Mr. BELL, a curious and inquiſitive gentleman, long a reſident in Ruſſia, informed his friend, Mr. Colinſon, (April 5th, 1745) that the Great, or Aſh-coloured Butcher-bird, is often taken by the bird-catchers in Ruſſia, and made tame. Mr. Bell had one given him; and he fixed a ſharpened ſtick, or long ſkewer, in the wall, for the bird to rooſt on, with the point outward: but the curioſity was, the ſingular nature of the bird; for if he let fly a ſmall bird, either linnet or green-finch, he would preſently fly from his perch, and ſeize the little bird in a particular manner by the throat, which ſtops his breath, and ſoon kills him. The next extraordinary thing obſervable was his carrying the bird he had juſt killed to his perch, and ſpitting it on the ſharp-pointed ſtick, drawing it on with his bill and claws; and thus would he ſerve one bird after another, ſpitting them and letting them hang by the neck, until he eat them at his leiſure. The inſtinct of ſpitting the dead birds is to enable him the better to pull them to pieces; for he has not ſtrength to hold them, as a hawk does, in his claws, and pull them with his bill; but being faſt ſpitted, he has ſtrength enough to diſſect. Theſe birds are much admired by the Ruſſians for the diverſion they afford them in ſeizing and killing their prey, and artfully hanging it up for their food. The bird above deſcribed is very near, and poſſibly may be the ſame with the Guiraru Nheengeta of Marcgrave.

Account of the NEEDLES, in the Iſle of Wight.

In the beginning of June 1761, I had the curioſity to viſit the Iſle of Wight, where I ſpent a week in ſeeing what was curious in that part of the iſland, and went off to ſea ſeveral times under the ſtupendous rocks and cliffs called the Needles. Many ſtrangers of our ſouthern counties viſit theſe parts yearly on the ſame account. When we enter ſome of our great cathedrals, their greatneſs and ſolemn gloomineſs ſtrike us with a pleaſing reverential kind of chilling horror; and when we view the magnificent palaces of ſovereign princes, we are ſtruck with beauty, harmony, and regularity, and a ſtriking ſenſe of the richneſs, power, art, and fine taſte, that could form ſuch terreſtrial heavens: but, O! when I had launched a little way into the ocean, and taken a full view of this moſt amazing and ſtupendous work of nature, all the ſenſations produced by temples and palaces, the works of art, were like ſhadows compared with real ſubſtances. The ſtupendous greatneſs of the rocks ſtrikes the beholder with chill horror, and amazement, never felt before. While a ſtranger is near them, he fears that ſome protuberant maſſes of the rock will give way and wreck his veſſel, and drown the preſumptuous ſpectator. It is neceſſary to keep a quarter of a mile's diſtance at leaſt, to make any judgment of the height of the cliffs. In ſome places it is near perpendicular; in others overhanging; in others there are rows of ſhelves, or lodgments, for the birds called *Puffins* and *Razor-birds*, where they ſit thick, in rows, tho' hardly diſtinct to be ſeen ſeparately, but their motion diſcovers them. In certain places high in the cliff, as well as under water-mark, you ſee great chaſms and deep caverns, that ſeem to enter far into the rock. Here and there are chryſtal ſtreams and broken rippling waters iſſuing forth pretty high in the rock. The ſtrata of chalk, ſtone, flints, &c. divided in ſome parts, on an almoſt plain ſurface, for the depth of ſix hundred feet, the heighth of the rock in many places affords great entertainment to a curious and inquiſitive mind. It is ſtrange to ſee ſheep and lambs feeding near the water's edge in the lower part of this cliff, and not eaſily conceivable how they get thither without being precipitated into the deep, but they have the power of treading ſurely in places inacceſſible to man. Though the birds are not counted eatable, yet many of them are deſtroyed through wantonneſs. When a gun is diſcharged from ſea under the rock, they fly off in ſuch amazing numbers as to darken the ſurface of the ſea under them. Great numbers are always ſeen fiſhing in the ſea, others ſitting in the cliffs, and many always paſſing and repaſſing over your boat. The fiſhermen make baits of their fleſh to catch lobſters, crabs, &c. The ignorant on this part of the iſland ſuppoſe that theſe birds are found in no part of the world, but at the Needles. The face of this ſtupendous rock extends about four miles, and very nearly, if not preciſely, facing the ſouth. The weſt point terminates in what is properly called the Needles, which are ſeveral vaſt rude obeliſks, or pillars, ſeparated by time and force of the ſea from the main rock, and ſtand detached from each other, ariſing immediately out of the ſea. Theſe birds, they ſay, are ſeen here not much above two months in the year, and firſt appear in the beginning of May. The fiſhermen, who are always about theſe rocks, declare that theſe birds are ſeen three or four times in the winter, for a day or two each time, in as great numbers as at their breeding time; and that they know when to expect them, which is after a little mild weather, when the ſun lies warm on the cliff, and the ſea beneath is pretty calm, to give them an opportunity to ſeek their food. The top of the cliff is barren, chalky, and ſtonny, down which feeds a great number of ſheep, cormorants, ſhags, gulls, Corniſh choughs, jackdaws, ſtarlings, wild pigeons, and many ſorts of ſmall birds, breed annually on theſe rocks.

Having in the Eſſays given the opinions of many ingenious men, reſpecting Birds of paſſage, we ſhall, in further elucidation of the ſubject, give the following

ing extract from a work entitled Huetiana *; on the* Immerſion of Swallows *in Sweden.*

The Swallows in Sweden, at the approach of winter, plunge themſelves into the lakes, and there remain aſleep and buried under the ice till the return of ſpring. Being then awakened by the genial warmth, they leave the water and take their flights as uſual. While the lakes are frozen, if you break the ice in ſome places which appear blacker than ordinary, you will find heaps of Swallows, cold, aſleep, and half dead. But if you take them out and warm them between your hands, or before the fire, they will immediately give ſigns of life, move, and ſtretch themſelves, and in a little while fly away. The common people fancy that the water of the lakes in Sweden has a virtue in it to change into ſwallows the leaves which fall from the trees in autumn. In other places, they hide themſelves in caverns, and under rocks. We have a great many of theſe caverns between the city of Caën and the ſea, along the river Orne, where ſometimes in the winter, large cluſters of ſwallows are found hanging at the roofs, like bunches of grapes. The ſame thing has been long ago obſerved in Italy; for Pedo Albinovanus, in his elegant elegy on the death of Mæcenas, mentions the retreat of ſwallows, as one of the ſigns of the approach of winter:

Conglaciantur aquæ, ſcopulis ſe condit hirundo,
Verberat egelidos garrula vere lacus.

To draw Birds preſerved in Spirits.

If any one would draw a bird preſerved in ſpirits, let him take it out, waſh it pretty well in warm water, and rinſe it in a good quantity of cold, and let it dry gradually, and he will reſtore the true colour of the feathers as far as can be; for ſome feathers, in the glaſſes of ſpirits, I have obſerved to appear of colours very contrary to the true colour they are of before they were put in.

Dampier, in his travels, tells us, that when ſeamen are thrown upon any of the unknown coaſts in America, they never venture upon the fruit of any tree, how tempting ſoever it may appear, unleſs they obſerve that it is marked with the picking of birds; but fall on without any fear or apprehenſion when they perceive the birds have been before them.

A
CATALOGUE
Of the NAMES of the
BIRDS, BEASTS, FISHES, INSECTS, PLANTS, &c.
CONTAINED IN
EDWARDS's Natural Hiſtory of Birds,
And his Gleanings of Natural Hiſtory, in a Generical Order.

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The

CATALOGUE

Des NOMS de tous les
Oiſeaux, Betes, Poiſons, Inſectes, Plantes, &c.

CONTENUS DANS

l'Hiſtoire Naturelle des Oiſeaux d'Edwards,
Et dans ſes Glanures de l'Hiſtoire Naturelle,
dans un Ordre Generique.

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